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Evidence-based systematic review: Oropharyngeal dysphagia behavioral treatments. Part IV—Impact of dysphagia treatment on individuals' postcancer treatments

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Abstract—This evidence-based systematic review (EBSR) is part of a series of reviews investigating swallowing behavioral treatments for individuals with dysphagia. This EBSR focuses primarily on individuals with dysphagia postcancer treatments. The seven behavioral interventions under review included three postural interventions (side lying, chin tuck, and head rotation) and four swallowing maneuvers (effortful swallow, Mendelsohn, supraglottic swallow, and super-supraglottic swallow). We systematically searched the dysphagia literature from March 2007 to April 2008. Six studies that met the inclusion and exclusion criteria were evaluated for methodological quality and characterized by research stage. Effect sizes were calculated when possible. All studies included were considered exploratory, with quality-marker scores ranging from 1 to 4 out of 7 possible markers. Five studies examined one or more of the four swallowing maneuvers, and one study addressed the chin-tuck posture. No studies addressed side lying or head rotation. Currently, limited evidence exists from six studies showing the positive effects of behavioral swallowing interventions for populations with structural disorder. Because of the range of structural deficits resulting from cancers and their treatments, further research is needed that evaluates specific intervention effectiveness.

Key words: chin-tuck posture, dysphagia, effortful swallow maneuver, evidence-based practice, evidence-based systematic review, head and neck cancer, head rotation posture, Mendelsohn maneuver, rehabilitation, side-lying posture, super-supraglottic swallow maneuver, supraglottic swallow maneuver, treatment.

INTRODUCTION

In recent years, multiple studies have investigated the prevalence of oropharyngeal dysphagia and dysphagia-related consequences for individuals' postcancer treatments [1–6]. Findings from these studies suggest that dysphagia may develop as a primary effect of the disease itself or as a result of surgical, radiotherapeutic, or chemotherapeutic treatments. Consequently, dysphagia may present as decreased range of motion (ROM), strength, and/or coordination of the muscles used for deglutition, resulting in delayed triggering of the swallow, reduced swallow efficiency, or reduced aspiration/penetration [7–8]. Often,

Abbreviations: ASHA = American Speech-Language-Hearing Association, BOT = base of the tongue, EBSR = evidence-based systematic review, ES = effect size, FOIS = Functional Oral Intake Scale, N-CEP = National Center for Evidence-Based Practice in Communication Disorders, PPW = posterior pharyngeal wall, ROM = range of motion, sEMG = surface electromyography, SLP = speech-language pathologist, UES = upper esophageal sphincter, VA = Department of Veterans Affairs.

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more serious complications, such as aspiration pneumonia, malnutrition, and poor quality of life, will develop [2,9].

Speech-language pathologists (SLPs) have an important role in evaluating and managing dysphagia secondary to postcancer treatments [9]. The primary treatment goal for many patients is to maintain functional oral feeding and prevent aspiration. As such, clinicians employ a number of behavioral swallowing interventions that alter bolus flow and/or the physiology of the swallow to reduce the risk of aspiration and maintain swallow function. Currently, a large body of literature describes the physiological effects of various postures and maneuvers in swallowers who are nondisordered (see article by Wheeler-Hegland et al., this issue, Part II, page 185). Yet to date, little is known about the impact of these interventions for individuals with structurally induced dysphagia.

The American Speech-Language-Hearing Association (ASHA) in collaboration with the Department of Veterans Affairs (VA) recently conducted a series of evidence-based systematic reviews (EBSRs) examining the state of the research on swallowing postural- and maneuver-based treatments as a means to assist SLPs engaging in evidence-based clinical practice. This review is the last in the series on seven behavioral dysphagia treatments, including swallowing postures and maneuvers for three population groups. The two preceding EBSRs report the impact of these treatments on swallowers who are nondisordered (Wheeler-Hegland et al., this issue, Part II, p. 185) and disordered secondary to neurological impairments (Ashford et al., this issue, Part III, p. 195). The present EBSR examined the current state of the science regarding postural interventions and swallowing maneuvers for populations with a structural disorder (i.e., head and neck cancer).

The clinical questions included in this review are outlined as follows:

1. What is the effectiveness of dysphagia behavioral interventions (i.e., side-lying, chin-tuck, or head-rotation postures; effortful swallow, Mendelsohn, supraglottic swallow, or super-supraglottic swallow maneuvers) on *swallowing physiology* for populations with a structural disorder (i.e., head and neck cancer)?
2. What is the effectiveness of dysphagia behavioral interventions (i.e., side-lying, chin-tuck, or head-rotation postures; effortful swallow, Mendelsohn, supraglottic swallow, or super-supraglottic swallow maneuvers) on *functional swallowing outcomes* for populations with a structural disorder (i.e., head and neck cancer)?
3. What is the effectiveness of dysphagia behavioral interventions (i.e., side-lying, chin-tuck, or head-rotation postures; effortful swallow, Mendelsohn, supraglottic swallow, or super-supraglottic swallow maneuvers) on *pulmonary health* for populations with a structural disorder (i.e., head and neck cancer)?

Postures were operationally defined as the repositioning of the body, head, and/or neck before the onset of the pharyngeal phase of the swallow while maintaining the position until the swallow was completed. Postures included chin tuck or neck flexion, side lying, and head rotation. Maneuvers were defined as movement of the oral, pharyngeal, or laryngeal structures before or during the pharyngeal phase of the swallow that are intended to increase swallow force or alter airway protection mechanisms. Maneuvers included effortful swallow, Mendelsohn, supraglottic swallow, and super-supraglottic swallow. Three outcomes were also considered when the clinical questions were constructed: (1) the impact of the seven behavioral interventions on swallow physiology (e.g., timing, efficiency, pressure, and elimination of aspiration), (2) functional swallow ability (e.g., oral feeding, weight gain, and quality of life), and (3) pulmonary health (e.g., aspiration pneumonia).

METHODS

A detailed account of the methods used to conduct this EBSR is described elsewhere in this series (Frymark et al., this issue, Part I, p. 175). In summary, a systematic search of the literature was conducted from March 2007 to April 2008 that investigated the impact of seven behavioral interventions on individuals with dysphagia postcancer treatments. Inclusion criteria specific to this review were that studies were published in a peer-reviewed journal from 1985 to 2008, were written in English, contained original data pertaining to one or more of the three clinical questions, and included adults aged ≥18 with structurally induced dysphagia. Studies that reported data on mixed populations; mixed swallowing treatments; or surgical, medical, or pharmacological interventions along with dysphagia treatment were excluded.

Two authors independently reviewed 219 citations with 90 percent agreement; 16 studies preliminarily met the inclusion criteria specific to the targeted population. Upon review of the full text, 10 studies were subsequently rejected, leaving a total of 6 studies in the final analysis.

Included studies were appraised for methodological quality with use of ASHA's levels-of-evidence scheme [10]. Two authors, blinded to one another's results, appraised accepted studies with 90 percent interrater reliability on the following quality indicators: study design, blinding, sampling and/or allocation, group and/or participant comparability, outcomes, significance, precision, and intention to treat when applicable. Any discrepancies in study appraisals were resolved by a consensus between all authors. A full description of the quality indicators and their corresponding quality markers can be found in this issue (see Table 1 in Frymark et al., this issue, Part I, p. 175). Studies received 1 point for each quality indicator that met the highest quality level. Studies incorporating controlled trials could obtain a maximum quality score of 8, while all other study designs in which intention to treat was not applicable could obtain a maximum quality score of 7.

With the decision tree depicted in Frymark et al. (see Figure 2 in article in this issue, Part I, p. 175), studies were then placed into one of four stages of research: exploratory, efficacy, effectiveness, or cost-benefit/public policy research. Effect sizes (ESs) were reported or calculated for outcome measures when possible [11]. We report a final synthesis of the body of scientific literature in this article based on the study quality-marker scores and corresponding stages of research.

RESULTS

Table 1 presents demographic and clinical characteristics of the 60 total participants with structurally induced dysphagia included in the six studies: 31 with head and neck cancer and 29 with esophageal cancer. Among the group with head and neck cancer, 8 were reported with oropharyngeal cancer, 8 with oral, 11 with pharyngeal, 3 with laryngeal, and 1 with hypopharyngeal. Medical treatment regimens for the participants with head and neck cancer included surgery (6/31 participants), chemotherapy (1/31 participants), radiation therapy (7/31 participants), surgery

Table 1.
Demographic and clinical characteristics of participants (N = 60) with structurally induced dysphagia included in six studies reviewed.

Study	*n*	Age (years)	Sex		Diagnosis	Medical Treatment	Time Postonset	Dysphagia Severity	Oral Intake
			Male	Female					
Crary et al., 2004 [1]	20	M = 67	13	7	Oral cancer: 7 Pharyngeal cancer: 11 Esophageal cancer: 2	Surgery: 6 Radiation: 7 Surgery + radiation: 7	M = 16.5 months	Severe	NPO
Lazarus et al., 1993 [2]	1	47	1	0	Oral cancer	Preoperative chemo, surgery, & postoperative radiation	6 months postsurgery	Severe	NPO
Lazarus, et al., 2002 [3]	1	72	1	0	Hypopharyngeal cancer	Initial chemoradiation, subsequent total laryngectomy	1 month postchemoradiation; postlaryngectomy	Severe	NPO
Lazarus, et al., 2002 [4]	3	M = 70	3	0	Laryngeal cancer: 3	Surgery + radiation: 2 Radiation + chemo: 1	NR	Mild	PO
Lewin et al., 2001 [5]	26	M = 66	23	3	Esophageal cancer: 26	Esophagectomy	6–43 days postoperation	NR	NR
Logemann et al., 1997 [6]	9	M = 60	6	3	Oropharyngeal cancer: 8 Esophageal cancer: 1	High-dose chemo + radiation	10 weeks–3 years	NR	NR

1. Crary MA, Carnaby Mann GD, Groher ME, Helseth E. Functional benefits of dysphagia therapy using adjunctive sEMG biofeedback. Dysphagia. 2004;19(3):160–64. [PMID: 15383945] DOI:10.1007/s00455-004-0003-8
2. Lazarus C, Logemann JA, Gibbons P. Effects of maneuvers on swallowing function in a dysphagic oral cancer patient. Head Neck. 1993;15(5):419–24. [PMID: 8407314] DOI:10.1002/hed.2880150509
3. Lazarus C, Logemann JA, Shi G, Kahrilas P, Pelzer H, Kleinjan K. Does laryngectomy improve swallowing after chemoradiotherapy? A case study. Arch Otolaryngol Head Neck Surg. 2002;128(1):54–57. [PMID: 11784255]
4. Lazarus C, Logemann JA, Song CW, Rademaker AW, Kahrilas PJ. Effects of voluntary maneuvers on tongue base function for swallowing. Folia Phoniatr Logop. 2002;54(4):171–76. [PMID: 12169803] DOI:10.1159/000063192
5. Lewin JS, Hebert TM, Putnam JB Jr, DuBrow RA. Experience with the chin tuck maneuver in postesophagectomy aspirators. Dysphagia. 2001;16(3):216–19. [PMID: 11453570] DOI:10.1007/s00455-001-0068-6
6. Logemann JA, Pauloski BR, Rademaker AW, Colangelo LA. Super-supraglottic swallow in irradiated head and neck cancer patients. Head Neck. 1997;19(6):535–40. [PMID: 9278762] DOI:10.1002/(SICI)1097-0347(199709)19:6<535::AID-HED11>3.0.CO;2-4

Chemo = chemotherapy, M = mean, NPO = nil per os (Latin: nothing by mouth), NR = not reported, PO = per os (Latin: by mouth).

and radiation therapy (7/31 participants), and surgery and chemoradiation treatment (10/31 participants). Of the 29 participants with esophageal cancer, 26 received esophagectomies and 3 received chemoradiation.

The majority of the participants, 78 percent (*n* = 47/60), were male with ages ranging from 47 to 70 years. Time postonset ranged from acute (6 days postoperative care) [12] to chronic (3 years postradiation) [13]. Only four studies reported pretreatment severity levels and oral intake [14–17]. Of those, three studies included participants with severe dysphagia, with all hydration and nutrition received through nonoral means [14–16]. One study by Lazarus et al. reported three participants with mild dysphagia [17]. They did not report diet levels.

Clinical Questions

Five of the six studies that met final inclusion criteria investigated the impact of behavioral treatments on swallowing physiology to address question 1 [12–13,15–17]. Five intervention postures or maneuvers were reported across these studies (**Table 2**). Three studies reported using the super-supraglottic swallow maneuver [13,15,17], two the effortful swallow [16–17], and two the Mendelsohn maneuver [15,17]. Single studies reported using the chin-tuck posture [12] and the supraglottic swallow maneuver [15]. Swallowing physiology posttreatment outcomes included oral and pharyngeal residue; aspiration; and temporal, distance, and pressure changes in measures of biomechanical events.

Two studies (**Table 3**) examined functional swallowing outcomes to address treatment effectiveness (question 2) using the Mendelsohn, the supraglottic swallow, and the super-supraglottic swallow maneuvers [14–15]. No studies addressing functional swallowing outcomes explored the effortful swallow maneuver or side-lying or head-rotation postures. None of the studies addressed pulmonary health outcomes (question 3).

Study Characteristics and Quality

Table 4 reports the methodological quality ratings and stage of research for all six studies. All studies were exploratory with quality-marker scores ranging from 1 to 4 out of 7 possible markers. The majority of studies (four of six) were case series reports [12–14,17]. The two remaining studies were single-subject case study reports [15–16]. All studies provided adequate participant descriptions. Three of the six studies had validated measures [12,14–15]. Three showed precision [13–14,17], and two of these three also showed significance [13–14]. Methodological weaknesses included a lack of a control group, a lack of blinding of assessors to treatment condition, subjects recruited using convenience sampling procedures, and lack of probability and ES data.

DISCUSSION

This article is the final in a series of three EBSRs of peer-reviewed studies evaluating the use of seven behavioral postures or maneuvers for the treatment of oropharyngeal dysphagia. This review examined the effects of these interventions on populations with structurally induced dysphagia. Dysphagia postcancer treatments are highly variable, and with the combinations of chemotherapy, radiation, and surgical treatments, investigating and predicting the effects of individual postures or maneuvers on this extremely heterogeneous population are difficult. All studies were exploratory with varying degrees of methodological rigor. Quality-marker scores ranged from 1 to 4 of 7 based on ASHA's levels-of-evidence scheme [10]. Methodological weaknesses included lack of controls, blinding, or randomization; small sample sizes; and descriptive data reporting. Only three studies provided data for ES calculations [13–14,17].

Results of this EBSR indicate very little information is available regarding the effects of behavioral dysphagia interventions with patients postcancer. Although limited by the small number (six) of studies included in the final analysis, the results show the positive effects of certain postural alterations and maneuvers and the limited effect of others on improvement of swallow physiology and function among specific populations with cancer.

Postural Techniques: Side Lying, Head Rotation, and Chin Tuck

As just mentioned, no studies were found that investigated the use of side lying or head rotation in the population with head and neck cancer. Studies examining the effects of the chin-tuck posture on the swallowing proficiency of individuals with oral and pharyngeal cancer and their subsequent treatments were not available. However, one study by Lewin and colleagues examined 26 participants postesophagectomy with oropharyngeal dysphagia characterized by aspiration on thin liquids, thick liquids, and puree consistencies [12]. In this study, the chin-tuck posture eliminated aspiration in 17 of 21 participants who aspirated before intervention.

Table 2.
Findings of clinical question 1: What is the effectiveness of dysphagia behavioral interventions (i.e., side-lying, chin-tuck, head-rotation postures; effortful swallow, Mendelsohn, supraglottic swallow, or super-supraglottic swallow maneuvers) on *swallowing physiology* for populations with a structural disorder (i.e., head and neck cancer)?

Study	Intervention	Outcome Measure	Effect Size
Lazarus et al., 1993 [1]	Mendelsohn maneuver Supraglottic swallow maneuver Super-supraglottic swallow maneuver	Duration of BOT to PPW contact Duration of laryngeal elevation Duration of glottic closure Duration of UES opening Distance of BOT movement Distance of laryngeal elevation Distance of UES opening % of aspiration	NR
Lazarus, et al., 2002 [2]	Effortful swallow maneuver	% of residual Timing of bolus movement Distance of structural movements Tongue manometry Maximum pressure tongue	NR
Lazarus, et al., 2002 [3]	Effortful swallow maneuver	BOT to PPW pressure	1.40
		Duration of BOT to PPW contact	3.70
		% of pharyngeal residual	1.00
	Super-supraglottic swallow maneuver	BOT to PPW pressure	1.70
		Duration of BOT to PPW contact	3.00
		% of pharyngeal residual	0.60
	Mendelsohn maneuver	BOT to PPW pressure	0.30
		Duration of BOT to PPW contact	2.10
		% of pharyngeal residual	1.00
Lewin et al., 2001 [4]	Chin-tuck posture	Aspiration	NR
Logemann et al., 1997 [5]	Super-supraglottic swallow maneuver	% of oral residual	0.58
		% of pharyngeal residual	0.30
		Laryngeal closure	0.98
		PPW movement	1.38
		Duration of BOT to PPW contact	0.08

1. Lazarus C, Logemann JA, Gibbons P. Effects of maneuvers on swallowing function in a dysphagic oral cancer patient. Head Neck. 1993;15(5):419–24. [PMID: 8407314] DOI:10.1002/hed.2880150509
2. Lazarus C, Logemann JA, Shi G, Kahrilas P, Pelzer H, Kleinjan K. Does laryngectomy improve swallowing after chemoradiotherapy? A case study. Arch Otolaryngol Head Neck Surg. 2002;128(1):54–57. [PMID: 11784255]
3. Lazarus C, Logemann JA, Song CW, Rademaker AW, Kahrilas PJ. Effects of voluntary maneuvers on tongue base function for swallowing. Folia Phoniatr Logop. 2002;54(4):171–76. [PMID: 12169803] DOI:10.1159/000063192
4. Lewin JS, Hebert TM, Putnam JB Jr, DuBrow RA. Experience with the chin tuck maneuver in postesophagectomy aspirators. Dysphagia. 2001;16(3):216–19. [PMID: 11453570] DOI:10.1007/s00455-001-0068-6
5. Logemann JA, Pauloski BR, Rademaker AW, Colangelo LA. Super-supraglottic swallow in irradiated head and neck cancer patients. Head Neck. 1997;19(6): 535–40. [PMID: 9278762] DOI:10.1002/(SICI)1097-0347(199709)19:6<535::AID-HED11>3.0.CO;2-4

BOT = base of the tongue, NR = not reported, PPW = posterior pharyngeal wall, UES = upper esophageal sphincter.

While a paucity of evidence exists for the chin tuck with the population with head and neck cancer, it is a behavioral posture prescribed frequently by clinicians. While Lewin and colleagues provide positive outcome data for using the chin-tuck posture, that study's participants had esophageal cancer, not oral or pharyngeal cancer [12]. This effect among the population with this specific cancer is important and is perhaps the best evidence from these six studies that can be applied to a population with cancer. However, prudence is clearly necessary when the use of the chin tuck is extended to patients with oral or pharyngeal cancer. The specific dysphagia symptoms described for the

Table 3.
Findings of clinical question 2: What is the effectiveness of dysphagia behavioral interventions (i.e., side-lying, chin-tuck, or head-rotation postures; effortful swallow, Mendelsohn, supraglottic swallow, or super-supraglottic swallow maneuvers) on *functional swallowing outcomes* for populations with structural disorder (i.e., head and neck cancer)?

Study	Intervention (Maneuver)	Outcome Measure	Effect Size/Relative Risk
Crary et al., 2004 [1]	Mendelsohn	FOIS	Relative risk 1.3 at 0.95
Lazarus et al., 1993 [2]	Mendelsohn Supraglottic swallow Super-supraglottic swallow	Functional oral intake—videofluoroscopic examination	NR

1. Crary MA, Carnaby Mann GD, Groher ME, Helseth E. Functional benefits of dysphagia therapy using adjunctive sEMG biofeedback. Dysphagia. 2004;19(3):160–64. [PMID: 15383945] DOI:10.1007/s00455-004-0003-8
2. Lazarus C, Logemann JA, Gibbons P. Effects of maneuvers on swallowing function in a dysphagic oral cancer patient. Head Neck. 1993;15(5):419–24. [PMID: 8407314] DOI:10.1002/hed.2880150509

FOIS = Functional Oral Intake Scale, NR = not reported.

Table 4.
Methodological quality ratings of exploratory stage of research for 6 studies of participants (N = 60) with structurally induced dysphagia.

Study	Design	Assessor Blinding	Random Sampling Described	Subjects Adequately Described	Valid Outcome Measures	Significance	Precision	Quality-Marker Score	Clinical Questions*
Crary et al., 2004 [1]	Case series	No	No	Yes	Yes	Yes	Yes	4 of 7	2
Lazarus et al., 1993 [2]	Case study	No	No	Yes	Yes	No	No	2 of 7	1, 2
Lazarus et al., 2002 [3]	Case study	No	No	Yes	No	No	No	1 of 7	1
Lazarus et al., 2002 [4]	Case series	No	No	Yes	No	No	Yes	2 of 7	1
Lewin et al., 2001 [5]	Case series	No	No	Yes	Yes	No	No	2 of 7	1
Logemann et al., 1997 [6]	Case series	No	No	Yes	No	Yes	Yes	3 of 7	1

1. Crary MA, Carnaby Mann GD, Groher ME, Helseth E. Functional benefits of dysphagia therapy using adjunctive sEMG biofeedback. Dysphagia. 2004; 19(3):160–64. [PMID: 15383945] DOI:10.1007/s00455-004-0003-8
2. Lazarus C, Logemann JA, Gibbons P. Effects of maneuvers on swallowing function in a dysphagic oral cancer patient. Head Neck. 1993;15(5):419–24. [PMID: 8407314] DOI:10.1002/hed.2880150509
3. Lazarus C, Logemann JA, Shi G, Kahrilas P, Pelzer H, Kleinjan K. Does laryngectomy improve swallowing after chemoradiotherapy? A case study. Arch Otolaryngol Head Neck Surg. 2002;128(1):54–57. [PMID: 11784255]
4. Lazarus C, Logemann JA, Song CW, Rademaker AW, Kahrilas PJ. Effects of voluntary maneuvers on tongue base function for swallowing. Folia Phoniatr Logop. 2002;54(4):171–76. [PMID: 12169803] DOI:10.1159/000063192
5. Lewin JS, Hebert TM, Putnam JB Jr, DuBrow RA. Experience with the chin tuck maneuver in postesophagectomy aspirators. Dysphagia. 2001;16(3):216–19. [PMID: 11453570] DOI:10.1007/s00455-001-0068-6
6. Logemann JA, Pauloski BR, Rademaker AW, Colangelo LA. Super-supraglottic swallow in irradiated head and neck cancer patients. Head Neck. 1997;19(6): 535–40. [PMID: 9278762] DOI:10.1002/(SICI)1097-0347(199709)19:6<535::AID-HED11>3.0.CO;2-4

*See p. 206 of main text for questions.

participants should be considered, because it may be that the symptoms instead of the specific cancer diagnosis would be sensitive in responding to the treatment. Better still would be a study using the chin tuck in populations with oral, pharyngeal, or laryngeal cancers.

Swallowing Maneuvers

Super-Supraglottic Swallow

Prevention of laryngeal aspiration by closing off the airway is one of the primary purposes of the super-supraglottic swallow maneuver. This maneuver was examined in three studies using a total of 13 participants with dysphagia post-cancer etiologies [13,15,17]. The Logemann et al. study reported fewer swallowing disorders among nine participants when using the super-supraglottic swallow maneuver than when not using it [13]. However, data reported from two additional studies suggest this maneuver may not be as effective in preventing aspiration as other interventions, such as the Mendelsohn maneuver [13,15].

Physiological measures studied included extent of the base of the tongue (BOT) retraction, lingual pressure against the posterior pharyngeal wall (PPW), laryngeal elevation, duration of laryngeal elevation, and width and duration of upper esophageal sphincter (UES) opening with the super-supraglottic swallow maneuver. During the maneuver, the BOT contacted the PPW more completely upon retraction in one participant with oropharyngeal cancer [17]. This study also reported longer durations of BOT to PPW contact and increases in lingual pressure against the PPW with use of the maneuver for the three participants with laryngeal cancer [17]. In the other two studies [13,15], laryngeal elevation was found to increase, as was the duration of laryngeal closure compared with normal swallows [15]. Interestingly, however, upper esophageal opening duration and width were significantly reduced in all nine patients using the super-supraglottic swallow in one study [11] but increased in the one patient reported in another study [15].

The findings from the Logemann et al. study reported that this maneuver prevented aspiration in five of nine participants with head and neck cancer [13]. However, compared with other maneuvers, the super-supraglottic swallow does not have a distinctive feature that separates its effectiveness and, in fact, may not be as effective in BOT to PPW contact, closing the larynx, or UES functions as other maneuvers, such as the effortful swallow and the Mendelsohn maneuvers. Based on the available evidence, the super-supraglottic swallow maneuver has minimal evidence for its use in patients with head and neck cancer.

Effortful Swallow

Studies using the effortful swallow maneuver included four participants reported in two studies [16–17]. One participant received a total laryngectomy following chemoradiation treatment failure [16]. Two participants received hemilaryngectomies along with radiation treatment, and the last participant received chemoradiation treatment only [17]. Physiologically, the effortful swallow maneuver produced increased pressure from the BOT to PPW contact. For the two participants with hemilaryngectomy and one nonsurgical participant, this maneuver resulted in BOT to PPW pressures near those demonstrated with participants who are nondisordered [17]. These pressures increased for the participant with a total laryngectomy and chemoradiation, resulting in the ability to clear thicker liquid consistencies from the neopharynx but did not approach those recorded for a normal control.

Fibrosis and scarring of the oropharynx secondary to radiation treatment are significant factors for patients with head and neck cancer. Review findings suggest that BOT ROM and pressure against the PPW are significantly reduced in these patients and affect the efficiency of oropharyngeal clearing of food boluses into the esophagus. The effortful swallow maneuver apparently is a more viable intervention approach to consider for patients with characteristics and may increase BOT to PPW pressure. Compared with all other maneuvers studied, the effortful swallow produced the most BOT to PPW pressure in these patients [17]. However, the increased muscle effort required may fatigue more quickly in fibrotic tissue and, as such, may adversely affect the execution of this maneuver over time, which was not explicitly addressed. Depending on the circumstances with each individual patient, this maneuver may assist some to approach near-normal swallowing pressures, thus improving oropharyngeal clearing efficiency. As with all postural or maneuver interventions, patients with head and neck cancer should only be recommended the effortful swallow maneuver after observation of its effectiveness under fluoroscopic or endoscopic evaluation.

Mendelsohn Maneuver

The effects of the Mendelsohn maneuver with individuals receiving surgical resection and chemoradiation for postcancer treatment are reported for 24 subjects in three studies [14–15,17]. The one participant in the Lazarus et al. study had received preoperative chemotherapy; resection of much of the BOT, the right faucial pillar, and portions of the right mandible; and postoperative radiation therapy [15]. The Mendelsohn maneuver was the only intervention (of three) to eliminate aspiration for this patient. Furthermore, this maneuver facilitated complete BOT contact with the PPW and provided the longest contact duration of all treatment approaches. Increased BOT to PPW contact duration with the Mendelsohn maneuver is also reported in three participants with laryngeal cancer [17]. Duration of laryngeal elevation increased more consistently with this maneuver and facilitated laryngeal closure durations approximating those recorded for participants who are nondisordered.

Crary et al. used the Mendelsohn maneuver with 18 participants with head and neck and 2 with esophageal cancer [14]. The study employed surface electromyography (sEMG) to monitor performance of maneuver and documented consistent functional oral intake changes using the 7-point Functional Oral Intake Scale (FOIS) [18]. Eighty percent of the participants increased oral intake by at least 1 scale score on the FOIS. Before behavioral intervention using the Mendelsohn maneuver, 12 of 20 participants depended on nonoral feeding. Of these 12 participants, 3 progressed from nonoral feeding to total oral feeding. The Mendelsohn maneuver was also shown to be more successful in returning a single participant to oral feeding compared with the two other maneuvers tested (supraglottic swallow and super-supraglottic swallow) in the study by Lazarus et al. [15].

The Mendelsohn maneuver with or without sEMG appears to be the treatment approach that produces the best results in returning patients to oral feeding. Promising intervention results that pair the Mendelsohn maneuver and sEMG suggest that the use of this biofeedback approach produces positive effects in patients with swallowing problems secondary to structurally based cancers.

Supraglottic Swallow

Only one case report examined the effects of the supraglottic swallow maneuver on swallow physiology among the population with head and neck cancer [13]. This participant received a composite resection of the right retromolar trigone area and received little benefit from the supraglottic swallow maneuver in altering BOT, laryngeal, and upper esophageal opening physiology during swallowing. The supraglottic swallow maneuver did not produce a functional change in the timing or extent of movements of the oropharyngeal structures affecting swallow physiology in this patient with oropharyngeal cancer. Ultimately, with little evidence available at this time, the impact of the supraglottic swallow is difficult to determine in populations with head and neck cancer.

CONCLUSIONS

Evidence-based practice seeks to inform the clinician of those treatments that have verifiable efficacy to support their use. EBSRs provide information regarding functional changes for individual treatments and for which group they are indicated. However, the judgment and clinical expertise of the SLP are an indispensable part of this evidence-based practice. Therefore, the variable nature of the characteristics of oropharyngeal dysphagia secondary to structurally based cancers and the available treatments place a large responsibility on the SLP. The clinician must be aware of the specific structural and physiological deficits in his or her patient and be familiar with the effects of the various postures and maneuvers in correcting these deficits. Additionally, because of the possibility of increased effort needed to achieve swallowing secondary to the decreased elasticity of irradiated tissues within this population, clinicians should test fatigue when considering a behavioral intervention. For all treatments, no approach should be recommended for a patient without verifying its positive effect.

The need for clinicians to apply their own experience to their individual patients' needs can be well illustrated in the use of the chin tuck for patients with dysphagia who have had an esophagectomy. In the study by Lewin et al., this treatment eliminated aspiration in 81 percent (17 of 21) of study subjects [12]. Conversely, the lack of data for the chin-tuck posture in populations with oral and pharyngeal cancer does not mean that use of this approach with those patients is contraindicated. It simply means that, as yet, no clinical research data exist to support or negate its use. If a clinician observes that a treatment approach works for his or her patient, the lack of evidence supporting its use does not contraindicate its use; it merely speaks against its unverified use and should not preclude its use.

These studies represent exploratory research and measure physiological baselines and changes resulting from the use of behavioral alterations. Because of the highly specific nature of deficits resulting from anatomical changes postcancer treatments, physiological information is essential in choosing dysphagia treatments for populations with cancer.

Dysphagia research for this population can be advanced in several ways. Studies of specific subpopulations with cancer (e.g., cancer type, treatment) are needed to determine the efficacy of these behavioral interventions. Larger multicenter studies are necessary to achieve sufficient sample size of specific populations and to have sufficient power. Consideration of fatigue is warranted during use of maneuvers, such as the effortful swallow or the Mendelsohn maneuver that require increased muscle effort. Multiple parameters should be measured for determining if the benefits from these maneuvers are sustained over time and are functional (i.e., measured during mealtimes). Future research should focus on clinical trials that target specific cohorts of subjects (i.e., head and neck cancer).

In summary, future research should test postural alterations and maneuvers in well-designed and controlled studies using quantifiable, relevant outcome measures, including pulmonary health outcomes. Additionally, studies should examine their effects on populations with dysphagia with similar etiologies (location of deficit, type of treatment, etc.). The results of this systematic review should be considered and weighed along with the clinician's expertise and the patient's preferences. By understanding all aspects of evidence-based clinical practice, the clinician acts as an integral part of the rehabilitation team to determine the best possible treatment for each patient with oropharyngeal dysphagia.

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