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Review

Evaluation and management of oropharyngeal dysphagia in different types of dementia: A systematic review

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ABSTRACT

Introduction: Dysphagia, or swallowing impairment, is a growing concern in dementia and can lead to malnutrition, dehydration, weight loss, functional decline, and fear of eating and drinking as well as a decrease in quality of life (QOL).
Objective: The aim of this article is to do a systematic review of the literature to determine the patterns of swallowing deficits in different types of dementia and to look at the usefulness of different diagnostic and management strategies.
Methods: An electronic literature search was done using five electronic databases from 1990 to 2011. One thousand and ten records were identified and 19 research articles met the inclusion criteria. These studies were heterogeneous in design and methodology, type of assessment and outcomes, so only descriptive analysis (narrative reporting) was possible.
Results: Prevalence of swallowing difficulties in patients with dementia ranged from 13 to 57%. Dysphagia developed during the late stages of frontotemporal dementia (FTD), but it was seen during the early stage of Alzheimer's dementia (AD). Limited evidence was available on the usefulness of diagnostic tests, effect of postural changes, modification of fluid and diet consistency, behavioral management and the possible use of medications. Use of Percutaneous Endoscopic Gastrostomy (PEG) tubes in advanced dementia, did not show benefit with regards to survival, improvement in QOL, or reduction in aspiration pneumonia. Significant gaps exist regarding the evidence for the evaluation and management of dysphagia in dementia.

Contents

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1. Introduction

Dementia is a condition in which there is progressive deterioration in cognition that affects day to day function. In 2001, the prevalence of dementia was approximately 24 million worldwide; it was estimated that this would rise to 42.3 million in 2020 (Ferri et al., 2005). North America has the largest number of affected individuals, with AD being the most common form of dementia (Ferri et al., 2005). Dysphagia may develop in patients with dementia during the course of their disease (Suh, Kim, & Na, 2009), and it often complicates the course of illness in these patients. Furthermore, dysphagia has been shown to occur in different types of dementia (Bine, Frank, & McDade, 1995; Langmore, Olney, Lomen-Hoerth, & Miller, 2007; Suh et al., 2009). Dysphagia refers to swallowing difficulties that may occur due to either oropharyngeal or esophageal problems. Unfortunately the swallowing disorder forms a barrier to food consumption, and can lead to weight loss, malnutrition, and dehydration (Easterling & Robbins, 2008; Hudson, Daubert, & Mills, 2000; Mendez, Friedman, & Castell, 1991; Mion, McDowell, & Heaney, 1994; Watson, 1997). The common reported symptoms in these patients would be pocketing of food in the mouth, difficulties with mastication, coughing or choking with food or fluid and the need for reminders to swallow food (Priefer & Robbins, 1997). Some of the contributing factors to oral phase dysphagia include inability to recognize food visually, oral-tactile agnosia, and swallowing and feeding apraxia (Logemann, 1998; Priefer & Robbins, 1997). Pharyngeal phase dysphagia leads to aspiration before, during and after swallowing (Finucane, Christmas, & Travis, 1999). Aspiration pneumonia has further been reported to be a cause of death in patients with dementia (Chouinard, Lavigne, & Villeneuve, 1998; Grasbeck, Englund, Horstmann, Passant, & Gustafson, 2003; Langmore, Skarupski, Park, & Fries, 2002).

Despite the growing number of individuals with dementia who suffer from dysphagia, there are only few studies reporting evaluation and management of this group. A systematic review done by Ashford et al. (2009) evaluated only behavioral treatments in oropharyngeal dysphagia with dementia and other neurological disorders. This review analyzes the entire spectrum of assessment and management of oropharyngeal dysphagia in demented subjects. The aim of this article is to do a systematic review of the literature according to PRISMA statement guidelines (Moher, Liberati, Tetzlaff, Altman, & The PRISMA Group, 2009) on the type of swallowing deficits with oropharyngeal dysphagia in different types of dementia and to look at the usefulness of different evaluation and management strategies.

2. Methodology

A literature search was performed using the following electronic databases: PubMed (Medline), Embase, Scopus, Psychinfo and Cinahl from 1990 to 2011. The MESH terms dysphagia, deglutition disorder, swallowing disorder, were combined with dementia, AD, vascular dementia (VaD), multi-infarct dementia, Lewy body dementia (DLB), Parkinson's disease dementia (PDD), FTD, diagnosis and management. The search was limited to only the English language, publication dates from 1990 to 2011 and human subjects. Studies included in this systematic review were case series, surveys, observational and randomized controlled trials discussing evaluation or management of dysphagia in different types of dementia including AD, VaD, DLB, PDD and FTD. Studies for evaluation include only Clinical Swallow Evaluation (CSE), Videofluoroscopic Swallow Studies (VFSS), and Fiberoptic Endoscopic Evaluation of Swallowing (FEES). The modes of assessments discussed are currently the standard of care for patients with oropharyngeal dysphagia. With regards to the management, evidence for the usefulness of dietary modifications (modifying food and liquid consistencies), environmental strategies (postural modification), oral rehabilitation (exercises to strengthen swallowing musculature), tube or enteral feeding and pharmacological treatments were analyzed. Management options discussed were the ones evaluated in the included studies.

Systematic and non-systematic review articles and duplicates were excluded. Studies that did not discuss either evaluation or management of dysphagia in individuals diagnosed with dementia were excluded (Fig. 1). Methodological qualities assessed included

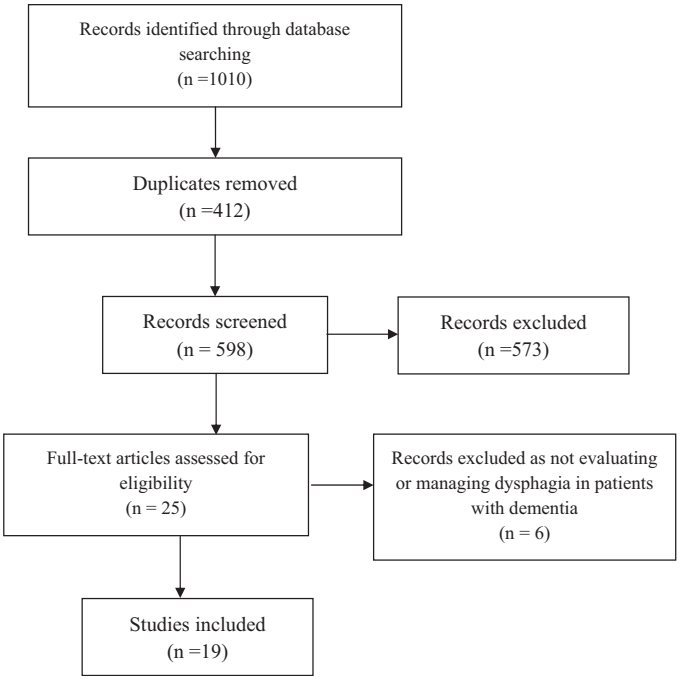

Fig. 1. Flow diagram.

evaluation of study design, sampling, outcomes, significance and level of evidence. These were reviewed by the first two authors independently, and consensus was reached on the results presented. The third author reviewed final summaries of included studies.

3. Results

A total of 1010 records were found. Nineteen research articles met the inclusion criteria (Fig. 1). Due to significant heterogeneity in design and methodology, type of assessment and with regards to primary outcomes, only descriptive analysis (narrative reporting) was possible. The prevalence of swallowing difficulties ranges from 13 to 57% in different types of dementia (Tables 1 and 2) (Bine et al., 1995; Horner, Alberts, Dawson, & Cook, 1994; Kyle, 2011; Langmore et al., 2007; Logemann et al., 2008; Suh et al., 2009; Yamamoto, Kobayashi, & Murata, 2010). The rate of dysphagia in patients with dementia residing in long-term care facilities has been estimated to be up to 53% (Chouinard et al., 1998; Langmore et al., 2002), and the rate of silent aspiration has been reported to be 68% in these patients (Garon, Sierzant, & Ormiston, 2009).

Data regarding diagnostic assessment and management of oropharyngeal dysphagia in patients with dementia was summarized in Tables 1 and 2, respectively.

3.1. Diagnostic assessment

CSE, VFSS, and FEES were the three main methods used to assess dysphagia in the included studies.

(a) The CSE includes a comprehensive swallowing history which may include a questionnaire, medical history, an oral motor (strength and range of motion of all oral structures involved in bolus formation) and sensory exam, and evaluation of swallowing of foods and liquids at various consistencies. Some of the parameters evaluated are oral activity, initiation of laryngeal elevation, pharyngeal and gag reflexes, oral praxis, dysarthria, voice measures, and trial swallows (delayed swallow, total swallow duration, laryngeal elevation, and swallows per bolus). Ikeda, Brown, Holland, Fukuhara, and Hodges (2002) used a questionnaire on swallowing problems, appetite change, food preference, eating habits and other oral behaviors and administered this to caregivers of patients with AD or FTD to determine the frequency of changes in eating behaviors. Subjects with SD, a variant of FTD, had more frequent changes in food preferences and eating habits than subjects with AD ($p < 0.01$) (Ikeda et al., 2002). There was also a significant difference between AD and FTD in the overall frequency of abnormal eating behaviors in different domains like food craving and indiscriminate eating ($p < 0.01$) and it was higher in FTD. However, the frequency of swallowing problems was higher in AD ($p < 0.01$) (Ikeda et al., 2002). Shinagawa et al. (2009) compared characteristics of swallowing problems in subjects with DLB and AD using a questionnaire. Study participants had a mean age of 80 years and had an average score of 18 on the Mini Mental Status Examination (MMSE). DLB patients had a significantly higher score than AD patients in the swallowing evaluation questionnaire ($p < 0.05$), indicating that DLB patients have more swallowing problems. There was a significant correlation between difficulty in swallowing solids and liquids ($p < 0.001$) and taking a long time to swallow, with unified Parkinson Disease Rating Scale (UPDRS) ($p < 0.03$). The common symptoms and signs suspicious for aspiration risk as evaluated by CSE, on any patients including stroke patients, are cough after swallowing, dysphonia, and abnormal gag reflex (McCullough, Wertz, & Rosenbek, 2001). In a study evaluating dysphagia in AD the laryngeal function (voice quality) component of CSE was abnormal in 52% of the patients, whereas VFSS indicated aspiration in 29% of these patients (Horner et al., 1994) suggesting that the voice quality or dysphonia symptom has limited usefulness in the diagnosis. The CSE was also used in the study to assess dysphagia in patients with FTLD and found abnormalities in half of the patients that were shown to have dysphagia with FEES (Langmore et al., 2007). The type of abnormalities with CSE was not reported in this study.

(b) The VFSS is the common radiological procedure done in clinical practice to determine the nature and extent of dysphagia. The radio-opaque material barium is usually mixed with liquids and foods of varying consistencies and administered to the patient to assess the nature of the swallowing disorder. In a study, eating behaviors of individuals with mild AD were compared with age-matched healthy controls (Priefer & Robbins, 1997). Patients with AD met the criteria for mild dementia as defined by the Clinical Dementia Rating Scale. The groups were videotaped while eating lunch in a cafeteria and each study subject was given a VFSS. The AD group required more verbal cues or direct assistance from their caregivers as compared to the controls. There were significant differences in the oral transit duration (bolus movement from oral cavity to ramus of mandible) for solids ($p < 0.05$), in the pharyngeal response duration (pharyngeal phase of swallowing) for liquids ($p < 0.05$), and in the total swallow duration for liquids ($p < 0.05$); all of these durations were prolonged in the AD group. Prolongation of oral transit duration reflects interference with initial oral preparation of bolus as well as initiating the swallow. Prolongation of the pharyngeal response and total swallow duration reflect pharyngeal delay, and the bolus may approach an unprotected airway and place these patients at increased risk for aspiration. A case-controlled study identified lowered blood oxygen level dependent (BOLD) responses in many cortical areas involved with normal swallowing in patients with early AD as compared to healthy controls. The mean age of participants with AD was 74 years, and their mean MMSE score was 23 (mild dementia). The mean MMSE score in the control group was 28. Range of motion results showed less hyoid and laryngeal elevation movements when compared to the control group ($p < 0.01$) (Humbert et al., 2010). Both of these are an integral part of the pharyngeal phase of swallowing.

In the prospective study by Horner et al. (1994) patients with moderate (MMSE score 11–20) to severe AD (MMSE score of 1–10) were evaluated using VFSS to determine the frequency of swallowing abnormalities, and the incidence of aspiration pneumonia. The oral praxis (ability to organize sequenced movements in the area of the mouth) score correlated significantly with severity of dementia ($p < 0.02$), and the global video fluoroscopic examination score (maximum of 28 points including aspiration subscale score) was also significantly different between moderate to severe dementia ($p < 0.02$). More patients with severe AD (44%) aspirated compared with individuals with moderate AD (12.5%), and eating dependency (caregiver rating scale) showed a significant negative association with duration and severity of dementia, i.e. lower MMSE scores were associated with greater need for caregiver assistance.

Suh et al. (2009) compared swallowing function in patients with moderate to severe AD and VaD using VFSS. AD patients had a mean age of 74 years and a mean MMSE of 9, whereas VaD patients had a mean age of 72 and mean MMSE of 11. Patients with AD had significant oral transit delay for liquids ($p < 0.008$), whereas patients with VaD showed more deficits in bolus formation and mastication ($p < 0.039$) and a higher frequency of silent aspiration

Table 1
Studies evaluating assessment of dysphagia in patients with dementia.

Study	Study design	Prevalence of dysphagia	Subjects	Assessment method	Type of assessment			Study conclusions/outcomes	Level of evidence
					CSE	VFSS	FEES		
1. Shinagawa et al. (2009)	Survey	PD ~ 50%	$N = 62$ 58% women Mean age = 79 years Dx – DLB, AD MMSE mean 17.7	Questionnaire, evaluating five domains: swallowing problems, appetite change, food preference, eating habits, other oral behavior	X			DLB patients had a higher score for swallowing problems than AD patients ($p < 0.05$).	B
2. Priefer and Robbins (1997)	Prospective case-controlled study	AD (NHR) 32%	$N = 10$ (AD), 13 (controls) Mean age = 68 years. Dx – mild AD As defined by the clinical dementia rating scale	Observed patients and controls have a meal.	X	X		AD patients had a prolonged oral transit duration for solids (0.41 s (semantic dementia (SD) 0.25) vs. 0.19 (SD 0.19), $p < 0.05$), pharyngeal response for liquids (1.10 (SD 0.19) vs. 0.92 (SD 0.21), $p < 0.05$ and total swallow duration for liquids (1.65 (SD 0.50) vs1.30 (SD 0.27), $p < 0.05$. AD patients received more cueing or assistance from their caregiver.	B
3. Humbert et al. (2010)	Case–control study	Not provided	$N = 24$, AD – 13, mean MMSE – 23, SD 2.1	functional Magnetic Resonance Imaging (fMRI) BOLD		X		Mean extent of hyoid movement was 9.79 ± 7.5 mm in AD and 13 ± 5.7 mm in controls ($p < 0.011$). Mean extent of laryngeal elevation was 12.7 ± 7.3 mm, and 18.8 ± 7.7 mm in controls ($p < 0.0001$).	B
4. Horner et al. (1994)	Prospective cohort study	AD 28.6–44%	$N = 25$ 56% F Mean age = 74 years Dx – moderate (MMSE 10–20) to severe AD (MMSE 1–10) MMSE mean 13.24	Caregiver questionnaire	X	X		Oral praxis score (moderate AD 45.8 (range 34–50) vs. severe AD 39.6 (range 33–45)), $p < 0.02$. Global video fluoroscopic score (moderate AD 25.8 (range 21–28) vs. severe AD 22.8 (range 14–28)), $p < 0.02$.	B
5. Suh et al. (2009)	Retrospective cohort study	AD 13% VaD 47%	$N = 49$ 38% F Mean age = 73 years Dx – AD, VaD			X		VaD patients had significant difficulty in bolus formation and mastication ($p < 0.039$) and had significantly increased risk of silent aspiration ($p < 0.01$). AD patients had a significant oral transit delay of well over 5 s ($p = 0.008$).	B
6. Ikeda et al. (2002)	Survey	FTD 26% AD 7%	$N = 91$ 37% F Mean age = 65 years Dx – AD, FTD, MMSE mean 20.2	Questionnaire evaluating five domains: swallowing problems, appetite change, food preference, eating habits, other oral behavior	X			Difference between AD and FTD in the overall frequency of abnormal eating behaviors in different domains ($p < 0.01$) and it was higher in FTD, except for swallowing problems which is higher in AD ($p < 0.01$).	B
7. Langmore et al. (2007)	Case–control study	FTLD 57%	N, case = 21, control = 9 Mean age = 61 years Dx – FTD MMSE mean 22.2	Interview regarding eating habits	X	X		When compared to controls, FTD patients let food leak into pharynx for excessive time ($p < 0.007$) and a third of the patients had incomplete bolus clearance ($p < 0.05$).	B

8. Leder et al. (2009)	Prospective cohort study	Not provided	N = 4062 43% F Mean age = 68 years Dx – dementia and neurological injury	Questions-regarding orientation, and following single-step command	X	X	Odds of liquid aspiration were 31% higher in if not oriented (odds ratio (OR) = 1.305; 95% confidence interval (CI) 1.134–1.501). Odds of liquid aspiration was 57% if could not follow one-step command (OR = 1.566; 95% CI 1.307–1.876); and odds of being unsafe for oral intake was 69% (OR = 1.688; 95% CI 1.387–2.054).	B

Levels of evidence based on the Agency for Healthcare Research and Quality interpretation:
Level A: Randomized controlled study, meta-analysis.
Level B: Cohort (prospective and retrospective) study, outcomes research study, case–control study, systematic review with appropriate search strategies and well substantiated conclusions.
Level C: Case-series study.

($p < 0.011$).The FEES can be done at the bedside. During FEES the patient is administered real food, with direct visualization of the larynx and evaluation of secretions using a flexible fiberoptic scope. FEES in contrast to VFSS cannot visualize the oral stage, and cannot visualize the actual swallow. Langmore et al. (2007) in their case–control study on different types of FTD (including progressive non-fluent aphasia (PNFA) and SD) showed FTD patients had an increased food leakage time (food in pharynx prior to initiation of swallow) when evaluated using FEES, with a significant difference between FTD and controls with regards to location of bolus at the onset of swallow, amount of food residue and aspiration severity ($p < 0.05$). This is in concordance with a previous study that has shown aspiration pneumonia to be a cause of death in these patients (Grasbeck et al., 2003).

In another study by Leder, Suiter, and Lisitano Warner (2009) conducted in an acute hospital setting on patients with dementia and neurological injuries, a series of questions were asked regarding orientation to person, place and time, along with one-step commands (open your mouth, stick your tongue out, and smile) to determine if this information was predictive of aspiration risk using FEES. The odds of liquid aspiration were 31% greater in individuals not oriented, and study subjects deemed unsafe for any oral intake were 69% of individuals who were not able to follow single step verbal commands ($p < 0.001$). The result of this study indicates that use of the orientation questions and simple verbal commands may help to identify individuals at risk for swallowing problems.

3.2. Management

3.2.1. Dietary modifications

Logemann et al. (2008) conducted a RCT in individuals with dementia or PD who were shown to aspirate when evaluated with VFSS. The interventions being studied were thin liquids with chin-tuck, nectar-thickened liquids or honey-thickened liquids. Overall, more participants aspirated on thin liquids with chin-tuck when compared with nectar-thickened liquids ($p < 0.001$) or honey-thickened liquids ($p < 0.0001$). The number of individuals who aspirated on nectar-thickened liquids was relatively higher when compared with honey thickened liquids ($p < 0.0001$). Robbins et al. (2008) conducted a randomized controlled three-group parallel design trial to investigate the effectiveness of chin-tuck posture, nectar-thickened liquids and honey-thickened liquids on the 3-month cumulative incidence of pneumonia in individuals with a diagnosis of AD, PD with or without dementia and who aspirated on VFSS. In this study, the overall 3-month cumulative incidence of pneumonia was 11%. A statistically significant difference was not seen with any of these interventions in preventing pneumonia, even though the overall incidence of pneumonia was much lower (20–40%) than expected in individuals with dementia.

3.2.2. Postural modifications

A randomized controlled study with cross-over design, investigated the feasibility of cervical spine mobilization in severe AD individuals with dementia who also had swallowing disorders. Patients included in the study were 65 years or older and had a MMSE score of <24. Patients received three 20 minute sessions of cervical spine mobilization performed by a physiotherapist. Dysphagia limit, defined as the maximum volume of water (up to 20 cm^3) that can be swallowed in one movement, was measured at baseline after the first session and at the end of the week. Overall, significantly improved swallowing capacity (dysphagia limit) was noted after one week treatment ($p < 0.03$) (Bautmans, Demarteau, Cruts, Lemper, & Mets, 2008).

Table 2
Studies evaluating management in patients with dementia who have swallowing disorders.

Study	Prevalence of dysphagia	Study design	Study population	Type of interventions				Study conclusions/outcomes	Level of evidence
				Modified diet	Postural modification	Medications/ physiotherapy	Feeding tubes		
1. Logemann et al. (2008)	PD 26% Dementia 20%	Randomized controlled trial	$N = 711$ Dementia, PD	Nectar-thickened fluids Honey-thickened fluids	Chin-down (tuck)posture			Significant aspiration on thin liquids with chin-tuck when compared with nectar-thickened liquids ($p < 0.001$) or honey-thickened liquids ($p < 0.0001$). Subjects aspirated more on nectar-thickened liquids when compared with honey thickened liquids (OR = 1.63, 95% CI 1.14–2.32). $p < 0.0001$).	A
2. Robbins et al. (2008)	PD 50%	Randomized controlled trial	$N = 515$ Dementia, PD with or without dementia	Nectar-thick liquid Honey-thick liquid	Chin-tuck with thin liquids			The 3-month cumulative incidence of pneumonia in the nectar consistency liquid group compared with honey consistency liquid group HR, 0.50 (CI 0.23–1.09); $p < 0.083$). Superiority of any of the interventions in preventing aspiration pneumonia could not be determined.	A
3. Bautmans et al. (2008)	Not provided	Randomized-controlled trial with cross-over design	$N = 15$ NHR with severe dementia			Cervical spine mobilization		Cervical spine mobilization significantly improves dysphagia limit from 3 ml to 5 ml after one session $p < 0.01$, and to 10 ml after one week treatment $p < 0.03$).	A
4. Kuo et al. (2009)	Not provided	Prospective cohort study	Advanced dementia Age > 66 Living in Medicare facilities				PEG	In 1 year the incidence of PEG insertion was 56/1000. Over 2/3 of insertions occurred in acute hospital setting with aspiration pneumonia, dehydration and dysphagia being most common reasons. One year mortality rate post PEG insertion was 64%.	B
5. Peck et al. (1990)	Not provided	Observational cohort study	$N = 52$ Dementia				Nasogastric, PEG and jejunostomy tubes	Increased risk of aspiration pneumonia ($p < 0.01$).	B
6. Sanders et al. (2000)	Not provided	Retrospective cohort study	$N = 361$ Dementia, oropharyngeal malignancy, Stroke or miscellaneous (head injury, PD, HIV, etc.)				PEG	High mortality in all who had PEG (28% at 30 days). Worse prognosis in patients with dementia (54% mortality at 30 days; $p < 0.0001$).	B
7. Mitchell et al. (1997)	Not provided	Prospective observational cohort study	$N = 1386$ (135 out of 1386 was fed via tube feeding) Dementia				PEG	No significant association with survival (RR 0.90, 95% CI 0.67–1.21).	B
8. Nair et al. (2000)	Not provided	Prospective observational study	$N = 88$ (case – 55, control – 33)				PEG	Mortality at 6 months was higher in those who had a PEG (44% vs. 26%, $p < 0.03$).	B

9. Gaines et al. (2009)	Not provided	Prospective observational study	$N = 190$ Dementia or neurological SCI	PEG	Decreasing serum albumin (OR 0.43, 95% CI 0.22–0.84) and increasing age (OR 1.08, 95% CI 1.04–1.12) are risk factors associated with 30-day mortality. Median survival of patients with dementia/severe cognitive impairment was 53 days compared with 78 days in patients without these diagnoses (Log rank $p < 0.845$).	B
10. Wada et al. (2001)	Not provided	Cohort study	$N = 8$ AD	Neuroleptics	Latency for swallowing increased, which increased the risk for aspiration pneumonia (OR 3.13, 95% CI 1.46–6.69, $p < 0.003$).	B
11. Yamaguchi et al. (2010)	Not provided	Case series	$N = 3$ AD, VaD	Dopamine agonists and ACEIs	Dopamine agonists and ACEIs led to prolongation of oral intake by 7 months to 2 years.	C

3.2.3. Enteral feeding/PEG

Kuo, Rhodes, Mitchell, Mor, and Teno (2009) looked at the incidence of feeding tube insertions in nursing home residents (NHR) with advanced dementia for a period of 1 year and found it to be 56/1000. The majority of tubes (2/3) were inserted during an acute hospitalization. The most common reasons for insertion were aspiration pneumonia, failure to thrive and dysphagia. The overall 1 year mortality rate was 64.1% with a median survival of 56 days post insertion of tube. Furthermore, 20% of these patients required a transfer back to hospital for tube related complications.

Few studies have evaluated the outcomes of NasoGastric (NG) tubes or PEG tubes in older individuals suffering from dementia. A study by Peck, Cohen, and Mulvihill (1990) showed 58% of enterally fed NHR with dementia had aspiration pneumonia as compared to 16% of those fed orally at six months ($p < 0.01$). Another prospective observational study by Mitchell, Kiely, and Lipsitz (1997) in NHR with severe dementia found no difference in survival with feeding tube placement (Relative Risk (RR) 0.90, 95% CI 0.67–1.21). A retrospective cohort study by Sanders et al. (2000) compared survival in patients with a diagnosis of dementia who received a PEG tube, to patients who had PEG tube insertion for other reasons including oropharyngeal cancer, stroke, and other neurological injuries. The 30-day mortality rate was 28% for the group that did not have dementia, and 54% in the dementia group ($p < 0.0001$); the 12 month mortality rate was 63% and 90%, respectively. Gaines, Durkalski, Patel, and DeLegge (2009) performed a retrospective cohort survival analysis to compare patients who received PEG tubes for dementia/severe cognitive impairment as a result of neurological injury to patients who received PEG tubes for other diagnoses. The 30-day mortality rate was 17.9% and there was no significant difference in survival between these two patient groups. Nair, Hertan, and Pitchumoni (2000), in an observational prospective case control study, showed mortality at six months was higher in patients who had a PEG tube (44% vs. 26%, $p < 0.03$). The patients in both groups were comparable with regards to age and gender, but it was not reported whether the control group had dementia subjects.

3.2.4. Medications

Wada et al. (2001) in their cohort study showed that neuroleptics used in AD patients increased the latency of swallowing reflex and the risk for aspiration pneumonia ($p < 0.003$). Yamaguchi, Maki, and Maki (2010) reported three cases where the use of dopamine agonists and angiotensin-converting enzyme inhibitors (ACEIs) exhibited prolonged oral intake for a period of seven months up to two years. Two of the patients had AD; one had aspiration pneumonia once over a period of two years, and the other had fever once over the seven-month period of observation. The third patient had VaD; she experienced fever once over a 20-month period of observation. These medications have been reported to reduce risk of aspiration pneumonia by way of increasing substance P, which enhances both swallowing and the cough reflexes.

4. Discussion

4.1. Main findings

The prevalence of dysphagia varies in different types of dementia and is more commonly seen in the nursing home population. It can occur with the early stages of dementia with AD (Humbert et al., 2010), but can occur in the late stage of other types of dementia including FTD (Ikeda et al., 2002). Mechanisms by which swallowing difficulties occur vary with different types of dementia. In patients with AD deficits tends to occur in the sensory aspects of swallowing, which leads to delayed oral transit time

(Suh et al., 2009). In patients with VaD however, the motor aspect of swallowing is affected, resulting in difficulty with bolus formation and mastication. In addition, individuals with VaD had a higher rate of silent aspiration as compared to AD patients (Suh et al., 2009). Extra pyramidal signs (EPS), autonomic dysfunction and fluctuations in cognition can lead to swallowing problems in patients with DLB/PDD. Furthermore, the UPDRS has been shown to be associated with dysphagia risk in the DLB (Shinagawa et al., 2009). In FTD there is a tendency to eat rapidly and compulsively, while taking large bolus sizes. They also have a tendency to leak food into the pharynx and this could be due to lack of awareness of food in the mouth. Incomplete bolus clearance, due in part to reduced force of contraction of tongue, pharynx and larynx, was also seen (Langmore et al., 2007).

The CSE alone cannot be used to rule out aspiration risk in patients with dementia. CSE underestimated the aspiration risk in aspirators, and overestimated the risk in individuals who did not aspirate with VFSS/FEES. FEES has equal or greater sensitivity in detecting laryngeal penetration and tracheal aspiration when compared with VFSS. This suggests that if a patient with dementia is found to be at higher risk for aspiration, the VFSS or FEES can be modified to evaluate different consistencies of food, so that the patient can be placed on an appropriate diet.

The usual approach to dysphagia management includes compensatory changes, which are immediate and include diet modification, as well as postural changes. Management of the primary disease causing dysphagia is also important. Postural changes (chin-tuck, supraglottic swallow maneuver) and use of thickened fluids like nectar-thickened liquids and honey-thickened liquids), may be helpful in patients with dementia though the effects in preventing aspiration are variable (Logemann et al., 2008; Robbins et al., 2008). Chin-tuck or any other type of postural modification would be difficult to institute in patients with dementia as they may not remember to follow instructions every time they swallow; hence, postural changes may be a less effective management strategy for individuals with dementia, especially in moderate to late stages. Another facet of dysphagia management involves rehabilitation such as cervical spine mobilization, but at this point only limited evidence was available regarding oral rehabilitation management in patients with dementia (Bautmans et al., 2008; Robbins et al., 2008). The use of selective serotonin reuptake inhibitors (SSRIs) in FTD may cause improvement in behavioral symptoms like compulsive eating, and thereby reduce the risk of aspiration (Swartz, Miller, Lesser, & Darby, 1997). Levodopa can improve the symptoms of dysphagia in LBD and PDD with better response in PDD. Similarly dopamine agonists and Angiotensin Converting Enzyme (ACE) inhibitors may have a role in reducing the risk of dysphagia with AD and VaD (Molloy, McKeith, O'Brien, & Burn, 2005; Yamaguchi et al., 2010), but more studies are needed to make a recommendation on this type of medication management. The use of neuroleptics has been shown to increase the latency for swallowing and increases the risk for aspiration pneumonia. Therefore when deemed necessary, a small efficacious dose should be used only for a short period to control behaviors. As well, patients should be monitored for swallowing difficulties when they are on antipsychotics (Wada et al., 2001). The majority of feeding tubes in dementia were inserted in an acute care setting with the most common causes being aspiration pneumonia and dysphagia (Kuo et al., 2009). Overall, with tube feeding, there was no improvement in survival and no decrease in aspiration risk in patients with advanced dementia.

4.2. Limitations

Limitations associated with this review include the small number of randomized controlled trials, large proportion of observational studies as well as the heterogeneity associated with the studies on assessment and management outcomes as well as the small number of studies on medical management. Many studies have methodological design bias, especially lack of comparability on key characteristics between intervention and control groups. Protocols vary with studies as well as outcome measures. Studies evaluating management were unable to blind direct care providers, due to the nature of intervention (modification of diet, insertion of a feeding tube or rehabilitation). In many studies, no assessment of risk of bias has been done.

5. Conclusions

Dysphagia is a common problem in patients with dementia and can be seen in about 50% at different stages of dementia. The timing of development of swallowing problems as well as the mechanisms causing dysphagia differs with the type of dementia. Limited evidence is available for clinical diagnostic assessment as well as for diagnostic tests like VFSS and FEES, interventions like dietary and postural modifications and for the medical management of dysphagia in dementia. Use of PEG tubes in advanced dementia did not show any benefit with regards to outcomes and survival. More research is needed as significant gaps exist in the evidence regarding diagnosis and management of dysphagia in individuals with dementia.

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