

MESTRADO INTEGRADO EM MEDICINA

Palliative Care Of Oropharyngeal Dysphagia In Patients With Dementia: A Scoping Review

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Resumo

Contextualização: os doentes com demência desenvolvem frequentemente disfagia orofaríngea, o que prejudica substancialmente a sua qualidade de vida e incrementa o risco de complicações potencialmente fatais. Tendo em consideração que a avaliação diagnóstica e a abordagem terapêutica da disfagia neurogénica em indivíduos com síndromes demenciais permanecem subexploradas, foi redigida uma *scoping review* por forma a contornar as lacunas no conhecimento existente acerca deste tema.

Objetivo: a presente *scoping review* tencionou resumir o conhecimento disponível relativo às opções avaliativas e terapêuticas existentes no âmbito da disfagia relacionada com demências.

Metodologia: este artigo aderiu às recomendações *Preferred Reporting Items For Systematic Reviews And Meta-Analyses Extension For Scoping Reviews*. Os estudos incluídos na revisão foram obtidos através de uma pesquisa *online* nas bases de dados ScienceDirect.com e PubMed, sendo que foram ponderados para inclusão somente artigos originais, publicados entre 2000 e 2023, e focados na questão da avaliação e da gestão da disfagia orofaríngea em doentes adultos com demência.

Resultados: 23 artigos conduzidos em 12 países distintos foram incluídos nesta revisão. No grupo de estudos com intuito avaliativo, várias ferramentas não demonstraram resultados promissores no que concerne à sua fiabilidade e viabilidade, ao passo que outras, nomeadamente a escala *American Speech-Language-Hearing Association – National Outcomes Measurement System*, a *Dysphagia Outcome Severity Scale*, a *modified Mann Assessment Of Swallowing*, o *Volume-Viscosity Swallow Test*, a *modified Oral Health Assessment Tool* e a avaliação geriátrica global, evidenciaram resultados encorajadores. Outros instrumentos, como a videofluoroscopia da deglutição, o *Water Swallow Test* e os testes eletrofisiológicos, também determinaram com sucesso a prevalência de disfagia nas respetivas amostras em que foram aplicados. No grupo de estudos intervencionais, as técnicas de nutrição entérica foram, de uma maneira geral, consideradas um fator de risco para deterioração no estado funcional e na sobrevida, em especial quando comparadas com a ingestão por via oral. Além disso, as dietas com texturas modificadas apresentaram, pelo menos, algum grau de utilidade, enquanto os mecanismos compensatórios da deglutição e a nicergolina evidenciaram resultados auspiciosos.

Conclusões: a escassez de conhecimento disponível relativo a este assunto persiste, sendo que a aplicação futura das medidas estudadas na prática médica está dependente de investigação adicional, que deverá ser conduzida em amostras mais extensas e que, idealmente, abranjam apenas um tipo de síndrome demencial por estudo.

Abstract

Background: patients with dementia commonly develop oropharyngeal dysphagia, which substantially downgrades quality of life and enhances the risk of potentially life-threatening complications. As the assessment and the management of neurogenic dysphagia in subjects with dementia remains largely unexplained, a scoping review was carried out so as to overcome the evidence gaps on this topic.

Objective: the present scoping review aimed to synthesise the available evidence on the evaluation and treatment options of oropharyngeal dysphagia in individuals with dementia.

Method: this article followed the guidelines of the Preferred Reporting Items For Systematic Reviews And Meta-Analyses Extension For Scoping Reviews. The studies included in the review were retrieved through an online search in ScienceDirect.com and PubMed, and only original reports published between 2000 and 2023 and focusing on evaluating and managing oropharyngeal dysphagia in adult patients with dementia were considered for inclusion.

Results: 23 reports conducted in 12 different countries were included in the review. Within the group of articles assessing dysphagia, several tools did not demonstrate promising results with regard to their reliability and/or feasibility, while others, namely the American Speech-Language-Hearing Association – National Outcomes Measurement System scale, the Dysphagia Outcome Severity Scale, the modified Mann Assessment Of Swallowing, the Volume-Viscosity Swallow Test, the modified Oral Health Assessment Tool, and comprehensive geriatric assessment, all showed encouraging outcomes. Other instruments, such as the Videofluoroscopic Swallow Study, the Water Swallow Test, and the electrophysiological studies, also successfully determined the prevalence of dysphagia within the respective samples in which they were employed. Within the group of interventional articles, enteral nutrition techniques were generally deemed as a risk factor for worse survival and/or functional status, especially in comparison with oral intake. Moreover, consistency-modified diets evinced at least some degree of applicability, while compensatory swallowing mechanisms and nicergoline revealed auspicious outcomes.

Conclusions: the available evidence on the assessment and management of oropharyngeal dysphagia in individuals with dementia is still underdeveloped, and the future use of the included approaches in medical practice is dependent on additional research, which should be carried out in more extensive samples, preferably involving only one dementia syndrome per study.

Abbreviations

AD	Alzheimer's Disease
AP	Aspiration Pneumonia
ASHA-NOMS	American Speech-Language-Hearing Association – National Outcomes Measurement System
BI	Barthel Index
BMI	Body Mass Index
CBS	Corticobasal Syndrome
CCI	Charlson Comorbidity Index
CDPwTL	Chin-Down Posture With Thin Liquids
CHF	Careful Hand Feeding
DLB	Dementia With Lewy Bodies
FEES	Fiberoptic Endoscopic Evaluation Of Swallowing
FTD	Frontotemporal Dementia
HTL	Honey-Thickened Liquids
LBD	Lewy Body Dementia
mMASA	Modified Mann Assessment Of Swallowing
MMSE	Mini-Mental State Examination
NTF	Nasogastric Tube Feeding
NTL	Nectar-Thickened Liquids
OD	Oropharyngeal Dysphagia
OHAT	Oral Health Assessment Tool
PAS	Penetration-Aspiration Scale
PEG	Percutaneous Endoscopic Gastrostomy
PD	Parkinson's Disease
PRC	People's Republic Of China
PRISMA-ScR	Preferred Reporting Items For Systematic Reviews And Meta-Analyses Extension For Scoping Reviews
ROK	Republic Of Korea
UK	United Kingdom
USA	United States Of America
VFSS	Videofluoroscopic Swallowing Study
VD	Vascular Dementia
V-VST	Volume-Viscosity Swallow Test

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1. Introduction

Dementia syndromes encompass a group of conditions representing an impairment in the level of cognition, leading to a functional compromise in day-to-day performance which jeopardises the patient's independence.¹⁻⁴ Estimates indicate a global prevalence of dementia accounting for about 47 million individuals (a number predicted to nearly triplicate to 131 million by 2050),⁴ while currently, in the population over 65 years of age, approximately 7% of people have dementia.¹ These data only make it clear that these syndromes embody a public health issue with an inconceivable medical and financial burden.^{2, 4}

The possible aetiologies of dementia include neurodegenerative and non-neurodegenerative causes, in addition to a cumulative combination of the two.¹ Moreover, dementias can be further categorised into irreversible or potentially reversible,¹ even though just a rather small number of patients fall into the latter, and, on top of that, they tend not to fully respond to treatment, owing to resultant structural damage of the brain.³ As a matter of fact, most patients with dementia present with some degree of neurodegenerative alterations,^{1, 3} whereas the most frequent configuration of dementia syndromes comprehends a combination of both neurodegenerative changes and vascular disease.⁴ Alzheimer's disease (AD) constitutes the leading form of neurodegenerative dementia,^{3, 4} affecting 5% to 6% of people aged at least 65 years,¹ followed by Lewy body dementia (LBD) and frontotemporal dementia (FTD).⁴ Furthermore, vascular cognitive impairment, which includes vascular dementia (VD), likely represents the second most common cause among all types of dementia.^{1, 3} Nevertheless, the establishment of an aetiologic diagnosis may be particularly challenging, especially in very advanced age patients, bearing in mind the increased prevalence of comorbidities, which may influence the presentation of dementia.² In truth, over one quarter of these syndromes derive from a combination of various neuropathological processes.³

Currently, the treatment of progressive dementia is unable to overturn the course of these disorders, as they produce a series of complications that inexorably conduce to death.³ Consequently, when in later stages, these syndromes are regarded as a terminal illness, prompting adequate palliative care of the aforementioned complications,^{3, 4} among which swallowing difficulties are included.^{3, 5, 6} Diagnosing oropharyngeal dysphagia (OD) in these patients may compose an exceptionally challenging task,^{7, 8} since cognitive impairment hampers the execution and the interpretation of the Videofluoroscopic Swallow Study (VFSS),⁷ one of the gold-standard techniques for assessing swallowing disorders,^{8, 9} as the patients' cooperation is unsatisfactory.⁸ The forms of dysphagia accompanying these syndromes share several characteristics throughout

the different disorders of the dementia spectrum,⁵ contributing to dehydration and weight loss, which are usually bolstered by other manifestations of dementia, namely the incapability to visually recognise food, oral-tactile agnosia,⁶ unwillingness to eat (caused by a diminished perception of appetite, depressive symptoms and/or a disapproval of hospital food)³ and eating apraxia.^{3,6} The pathophysiology behind dysphagia in AD can, in essence, be summed up in changes in the autonomous nervous system which menace deglutition in its oral and pharyngeal stages, and in modifications in the cortical mediation of swallowing,¹⁰ as well as a frequent deterioration of the sensory mechanisms implicated in deglutition, culminating in a belated oral transit time.⁹ Notwithstanding the earlier onset of swallowing disorders in patients with AD, these changes appear to present as more subdued when compared with dysphagia in other forms of dementia, such as FTD and LBD.¹⁰ In effect, in FTD, feeding issues arise from hypothalamic degeneration with consequent breakdowns of connections between the hypothalamus and the orbitofrontal cortex, and disintegration of the mesolimbic pathway,¹¹ whereas, in LBD, swallowing disorders are rooted in sensory decline, dysautonomia, and fluctuations in cognition.⁹ By contrast, in VD, the motor component of swallowing is impaired, causing problems in mastication and bolus formation.^{9,11} The usual features of dysphagia in individuals with dementia thus include a difficult mastication, food pocketing in the mouth, the requirement of reminders to swallow, coughing⁶ and choking with liquids and solids.^{3,6} Additionally, OD causes aspiration,^{5,6} a complication which is driven by other aspects, such as a bedridden condition, an older age, periodontal disease, an impaired level of consciousness, and respiratory and gastrointestinal tract intubation.⁵ Ultimately, aspiration brings about aspiration pneumonia (AP), which is credited as a common cause of death in people with dementia syndromes.^{5,6} Efforts to overcome these manifestations involve handfeeding (for eating apraxia), the administration of orexigenic compounds and antidepressants (for food rejection), texture-modified diets (for dysphagia and choking) and, at last, enteral-feeding in order to ensure adequate nutrition and the prevention of aspiration.³ However, the number of studies focusing on handling dysphagia in patients with dementia remains scarce,⁶ which possibly explains the lasting complexity of the management of this symptom in the context of dementia.⁵ In actual fact, the approaches applied to prevent aspiration exhibit insufficient evidence with regard to their purpose,⁵ as well as it has repeatedly been shown that tube-feeding does not offer major advantages to these patients.¹²

In 2013, Alagiakrishnan and colleagues⁶ reviewed the oropharyngeal swallowing deficits inherent to dementia syndromes and their respective means of diagnosis and management. Previously, in 2009, Langmore and colleagues⁵ had reviewed palliative care for OD in chronic diseases, including dementia syndromes. Both of these articles found significant evidence gaps on

this topic.^{5, 6} The lack of methodically organised information pertaining to this subject in the last 10 years thus incites the elaboration of the present scoping review, which aims to further clarify optimal evaluation, management, and treatment of OD in patients with dementia by showcasing the state of the art in this particular matter. A scoping review was the chosen approach to synthesise the collected evidence, as it acts as the preferred method of determining and mapping the range of existing knowledge on a given issue, especially in situations in the same vein as the subject in question, where evidence gaps represent a considerable hurdle,¹³⁻¹⁶ and where the available information, which is heterogeneous in nature,¹³⁻¹⁵ has not been comprehensively reviewed in previous papers.^{15, 16} This way, the research question serving as the cornerstone for guidance of this review was the following: “what is the available evidence on the assessment and management of oropharyngeal dysphagia in patients with dementia”?

2. Methods

This scoping review adhered to the Preferred Reporting Items For Systematic Reviews And Meta-Analyses Extension For Scoping Reviews (PRISMA-ScR) guidelines.¹⁴ No review protocol was elaborated for this article.

2.1. Search Strategy

An online search was carried out across two electronic databases: ScienceDirect.com and PubMed. The included search terms were the following: “oropharyngeal dysphagia”, “dementia”, “palliative care”, “Alzheimer’s disease”, “Lewy body dementia”, “frontotemporal dementia” and “vascular dementia”. These keywords were combinedly applied in an extensive number of variations. The most recent keyword search took place on December 22nd, 2023. All retrieved results were exported to EndNote 21™ and then further managed on that platform.

2.2. Selection Criteria

Inclusion criteria consisted of original research articles focused on the assessment and management of patients aged at least 18 years old, either fulfilling criteria for the diagnosis of dementia or with an established diagnosis of dementia, and concomitant OD. Only English language original research articles published between January 2000 and December 2023 were included in this scoping review. In order to map the broadest possible range of evidence, no

geographical/sociocultural restriction or sample size limit was applied. All studies with a population under 18 years old and/or without a probable or established diagnosis of a dementia syndrome with accompanying OD were excluded, along with papers in languages other than English or with any article typology other than original research, namely any sort of revision, case report, guideline, or grey literature.

2.3. Data Charting

The studies were screened for eligibility for inclusion via a title and abstract analysis. Thereafter, a full-text review of the obtained records was performed so as to verify that they effectively satisfied the selection criteria. Data was then extracted from the retained articles in the form of a table, which was completed with the following information: main author responsible for the article, year of publication, country of research, article methodology, description of the study's population, dementia syndrome handled in the study, outcome measures, and main findings.

3. Results

3.1. Search Results And Study Selection

The online search performed on both above-mentioned databases yielded 547 records, 506 being exported from ScienceDirect.com and the remaining 41 from PubMed (Figure 1). After removing the duplicates, 337 records remained in the sample, of which 253 were eliminated after analysing the respective titles and abstracts. Out of the 83 full-text articles considered for inclusion, 60 were removed, resulting in a total of 23 studies that matched the eligibility criteria and were consequently included in the scoping review.

3.2. Overview Of Studies

The extracted data for all the articles included in the review is shown in Table I, Table II, Table III, and Table IV. The studies were divided into two sets: a group of evaluative studies ($n = 12$)^{9, 11, 17-26} and a group of interventional ones ($n = 11$).²⁷⁻³⁷ The former focused on screening and diagnosis of dysphagia in patients with dementia, whereas the latter dealt with therapeutic procedures aiming to lessen the burden arising from swallowing disturbances in the context of dementia. In each group, the studies were further classified into smaller, more specific categories, in order to delineate the main concepts of the research. Therefore, the group of evaluative studies

incorporates five categories of articles divided as follows: imaging techniques (n = 2),^{9, 17} clinical scales (n = 5),^{11, 18-21} swallowing tests (n = 3),²²⁻²⁴ electrophysiological studies (n = 1),²⁵ and comprehensive geriatric assessment (n = 1).²⁶ On the other hand, the group of interventional studies integrates three categories labelled as follows: alternative feeding routes (n = 6),²⁷⁻³² texture-modified diet and/or compensatory mechanisms (n = 4),³³⁻³⁶ and pharmacological interventions (n = 1).³⁷ This grouping approach is not mutually exclusive, as several discussed strategies featured multiple modalities, combining multiple measures within the same article.

Of the 23 studies, six were conducted in the United States Of America (USA),^{18, 21, 27, 28, 33, 34} four in Japan,^{17, 26, 35, 37} two in Belgium,^{20, 36} Spain^{9, 24} and the United Kingdom (UK)^{29, 30} respectively and one each in Brazil,³² the People's Republic Of China (PRC),³¹ France,²² Germany,²³ Italy,¹¹ the Republic Of Korea (ROK),¹⁹ and Türkiye.²⁵ Most articles exclusively focused on patients with dementia (n = 13),^{11, 18, 19, 22-26, 28, 31, 32, 35, 36} but the remaining reports included patients with other diseases and disorders in their sample, namely Parkinson's disease (PD) (n = 4),^{17, 21, 33, 34} miscellaneous diseases (n = 2),^{29, 30} dysphagia without dementia (n = 2),^{9, 37} and other unspecified conditions (n = 2).^{20, 27} All the reports at issue were quantitative in nature and they were more frequently cohort studies (n = 11),^{17, 20, 22-24, 27-32} followed by cross-sectional studies (n = 4),^{9, 11, 19, 25} randomised controlled trials (n = 3),^{34, 36, 37} randomised clinical trials (n = 2),^{21, 33} non-randomised clinical trials (n = 2),^{26, 35} and a case-control study (n = 1).¹⁸

3.3. Evaluative Studies

3.3.1. Imaging Techniques

Two reports^{9, 17} explored the role of the VFSS, one of the gold-standard methods for diagnosing OD and for ascertaining the effectiveness and safety of deglutition in the elderly,⁹ in assessing dysphagia in patients with dementia. Both of these studies served different purposes as they, more concretely, not only handled the pathophysiological aspects of OD, but also delved into the prognostic value of the exam.

In an observational, retrospective, cross-sectional study,⁹ the VFSS and its classification according to the Penetration-Aspiration Scale (PAS) were used to characterise the pathophysiology of OD in subjects with dementia, and the role of antipsychotic medication in this context was also additionally explored so as to perceive the independent impact of these drugs on OD.⁹

On the other hand, in a prospective cohort study,¹⁷ the occurrence of airway penetration and aspiration in patients with LDB or idiopathic PD was assessed using the VFSS, during which

each subject was also assigned a score in the Hoehn and Yahr scale, so that the research team could further inquire into the time elapsed from undertaking the exam until the onset of pneumonia and discontinuation of oral intake during a 24-month follow-up period.¹⁷

3.3.2. Clinical Scales

Five articles^{11, 18-21} delved into the capacity of clinical scales to screen for dysphagia in the context of dementia.

In one of them, a retrospective cross-sectional study¹¹ carried out in individuals with minimal to mild cognitive deterioration and suspected OD, every participant was successfully assessed with a personal modified protocol of fiberoptic endoscopic evaluation of swallowing (FEES), comprising the administration of three thin water-containing liquids and three thick aquagel-containing liquids, followed by a soft and a hard solid both in neutral head position and in a chin-down posture. The PAS was applied thereafter. Speech pathologists also took part in the assessment by applying the MD Anderson Dysphagia Inventory (which is responded according to the patients' own subjective view on their swallowing function) and the Mini-Mental State Examination (MMSE), in addition to getting involved in mealtime observation. The patients' caregivers partook in the evaluation as well by completing the Caregiver Mealtime and Dysphagia Questionnaire, which determined the appropriateness of their management of the patients' situation. In the end, the severity of dysphagia was categorised according to the American Speech-Language-Hearing Association – National Outcomes Measurement System (ASHA-NOMS) scale.¹¹

Additionally, in an observational case-control study¹⁸ conducted in subjects with corticobasal syndrome (CBS) and healthy controls, the features of swallowing and speech disorders were described and the National Institutes of Health-Speech Pathology Swallowing Questionnaire (a 19-item subjective swallowing survey filled in by each participant) was implemented with the intention of acknowledging whether it is able to foresee swallowing impairment on the ultrasound swallow study and/or the modified barium swallow study, which were also performed. The ultrasound assessment was based on timing the oropharyngeal phase, through three wet swallows (water-containing boluses) and three dry swallows (boluses solely incorporating saliva) during the execution of the imaging technique. Moreover, the modified barium swallow test, which evaluates the oral and pharyngeal phases of swallowing and screens the oesophageal phase, encompassed three barium swallows with different volumes and viscosity.¹⁸

In a retrospective, cross-sectional, clinical study¹⁹ conducted in a population with mild to moderate AD and VD, the findings on the modified Mann Assessment Of Swallowing (mMASA), a health professional-administered clinical protocol with validated use in the evaluation of post-stroke dysphagia, were compared with the ones on the VFSS. In this case, the mMASA was administered by an occupational therapist while the scores were verified by a physiatrist.¹⁹

Moreover, in a multicentre cohort study,²⁰ the research team availed itself of the scope of knowledge and practice of three speech pathologists so as to test the viability and the trustworthiness of the modified Oral Health Assessment Tool (OHAT), a scale entailing few qualifications, which consists in assigning a score to each of eight oral health related categories following a structured observation of the oral cavity. Feasibility measured the time needed to fulfil the tool, capacity to rate every category and potential challenges during the use of the OHAT, while reliability was related to inter-rater, test–retest, and intra-rater variability. The ultimate goal was to understand whether the modified OHAT can be incorporated into a thorough clinical swallowing evaluation, as oral health plays a vital part in deglutition, hence potentially causing OD when deteriorated.²⁰

Lastly, in a randomised clinical trial,²¹ the discernment of speech-language pathologists was compared with that of medical experts on the evaluation of aspiration and the use of the PAS applied to a set of videofluoroscopic data in which patients with dementia or PD were under compensatory mechanisms of dysphagia, more precisely chin-down posture with thin liquids (CDPwTL) and head-neutral posture with both nectar-thickened liquids (NTL) and honey-thickened liquids (HTL).

3.3.3. Swallowing Tests

Of the included reports, three articles²²⁻²⁴ involved swallow tests for screening for dysphagia.

In a prospective monocentric cohort study,²² the Volume Viscosity Swallow Test (V-VST), a clinical screening test comprising the use of different consistencies and volumes in each bolus, was used for estimating the prevalence of OD in a population with dementia, as it examines the safety and the efficacy of deglutition and respectively classifies variations in the former and in the latter as potential signs of an increased risk for AP and an enhanced possibility of developing malnutrition. Furthermore, the study also focused in assessing the viability of the V-VST test in

ambulatory care, and in exploring correlations between OD and geriatric parameters, and between the level of cognitive impairment and OD.²²

In a cohort study,²³ geriatric subjects with dementia and healthy controls were screened for their risk of aspiration by means of an original method called “Albertinen Dementia Dysphagia Screening”, which integrates a water-swallowing test and the trial of three distinct food textures (water, apple puree and apple slice). The subjects were asked to try these textures precisely in the aforementioned order, as signs of aspiration (at least two of the following: decrease of no less than 2% in oxygen saturation, coughing, and wet or hoarse vocal quality) were registered. The participants also had the chance to further undergo a FEES following the screening, so as to compare the results of a formal assessment of their swallowing disturbances with the outcomes of the screening protocol.²³

The final article in this section is a prospective cohort study²⁴ also dealing with a water-swallowing test, which was executed in just over half of the patients in a sample of subjects with dementia hospitalised due to AP. The purpose of this report was to analyse in-hospital and six-month mortality, as well as prognostic factors of these patients.²⁴

3.3.4. Electrophysiological Studies

The only article referring to non-invasive electrophysiological swallowing testing in the review is a cross-sectional study²⁵ aiming at detailing the electrophysiological mechanisms behind deglutition in each stage of AD by using two tests, the dysphagia limit, and the sequential water swallowing, in order to compare them with healthy individuals. While the dysphagia limit test reports the maximal functionally feasible liquid swallowing capacity, the sequential water swallowing test provides information pertaining to the duration of the swallowing period and swallowing apnoea.²⁵

3.3.5. Comprehensive Geriatric Assessment

Only in one article, a single-arm, non-randomised trial with historically controlled patients for comparison,²⁶ were explored the effects of comprehensive geriatric assessment, carried out by a multidisciplinary body of healthcare professionals, on the establishment of the aetiology of swallowing disorders and on the consequent chosen intervention in subjects with dementia with a very diminished oral intake who were dependent on artificial hydration and/or nutrition. This

multidisciplinary group, composed by generalist medical doctors, nurses, pharmacists, physiotherapists, occupational therapists, speech pathologists, dietitians, dentists, dental hygienists, and certified care workers, created an original clinical pathway which embodied a combination of evaluations performed by each of its specialists, as well as a videoendoscopy. The findings on both of these subsequently led to the additional execution of more adequate assessment measures whenever necessary so as to ultimately obtain an aetiological diagnosis of the patients' swallowing disorders, which, in turn, prompted the introduction of interventional approaches, which were put into practice by another group of healthcare professionals. In the historically controlled group, however, the patients' care plan was solely arranged by their medical doctor, who passed on the information to other healthcare providers, so that they could implement the pre-established rehabilitation measures.²⁶

3.4. Interventional Studies

3.4.1. Alternative Feeding Routes

Six articles²⁷⁻³² investigated the impact of diverse enteral nutrition modalities in patients with dementia: four of them²⁷⁻³⁰ handled the effects of percutaneous endoscopic gastrostomy (PEG) feeding tubes, whereas another study³¹ compared the results of nasogastric tube feeding (NTF) with oral nutrition, and the remaining one³² compared the outcomes of enteral nutrition (both NTF and gastrostomies) with oral nutrition.

In a prospective cohort study,²⁷ the functional evolution of patients with stroke, dementia, cancer, and other conditions referred for PEG feeding tube placement was recorded by means of a post-procedure questionnaire on survival and functional status, which was administered in five key moments throughout the 12-month follow-up period.²⁷

In another prospective cohort study,²⁸ patients with dementia and dysphagia referred for PEG tube insertion were accompanied for six months so as to clarify how nutritional parameters at the time of the surgical procedure affect survival.²⁸

In a retrospective cohort survival analysis²⁹, the mortality of PEG tube-fed individuals with dementia was compared with the mortality of PEG tube-fed patients with stroke, oropharyngeal cancer with dysphagia, and other conditions during a 12-month timespan.²⁹

In a prospective observational study³⁰ carried out by essentially the same authors as the previous article, the research team devised guidelines for PEG feeding tube insertion focusing on

indications for the procedure, patients' comorbidities, and nutritional status, and assessed their impact on survival during a 32-month period by comparing outcomes in two British hospitals, one which implemented them and another one that did not.³⁰

In a retrospective longitudinal cohort study,³¹ the influence of two different feeding modalities, nasogastric tube feeding (NTF) and careful hand feeding (CHF), on the one-year survival and pneumonia incidence of patients with advanced dementia and feeding problems, such as OD and/or behavioural issues, was studied.³¹

At last, in a prospective, non-randomised and unblinded cohort study,³² the outcomes of individuals receiving oral and enteral feeding were compared during a minimum follow-up period of six months, during which caregivers were telephonically contacted in order to give feedback on episodes of pneumonia and hospitalisations, as well as to provide information on whether the patient had passed away in the meantime.³²

3.4.2. Texture-Modified Diet And/Or Compensatory Mechanisms

Two reports^{33, 34} examined the influence of CDPwTL, HTL and NTL on dysphagia and two other reports covered each a different compensatory mechanism (a candy sucking test³⁵ and cervical spine mobilisation).³⁶

In a randomised clinical trial,³³ patients with dementia and/or PD tried NTL, HTL (both in a neutral cephalic position) and CDPwTL in a randomly assigned order with the aim of acknowledging which of these interventions provides the best immediate outcomes on eradicating aspiration on thin liquids during the VFSS.³³

In a randomised, controlled, parallel-design trial³⁴ conducted by a similar team, the same three techniques were employed in individuals with PD and/or dementia during a three-month period so as to evaluate their effect on the cumulative incidence of pneumonia, which was assessed based on clinical parameters and (if needed) a chest radiography. Patients were assigned into only one of the modalities based on their performance on the VFSS for each intervention, and their meals were monitored by care providers and study staff during the follow-up period.³⁴

On the other hand, in an interventional study,³⁵ researchers tested a dysphagia training technique, the Candy Sucking Test, in geriatric patients with dementia. This exercise was conducted for ten minutes before lunchtime, three days a week, for six months, and it consisted in

sucking a lollipop in order to measure the patients' swallowing function by determining the weight difference of the sweet per minute of sucking.³⁵

Finally, in a randomised controlled trial with a crossover design,³⁶ the viability of cervical spine mobilisation in nursing home residents with severe AD, paratonia with altered neck posture, and dysphagia was assessed, as well as its influence on swallowing capacity. The intervention comprised a three-week program of one week of cervical spine mobilisation (three sessions per week), one week of wash-out and one week as controls. Neck mobilisation was performed by a physiotherapist who held the patients' head in their hand or arm and smoothly manipulated it so as to obtain a neutral cephalic position, while each patient was seated and backed their head against the physiotherapist's chest. During the wash-out week, no measures were put into practice, and, during the control week, patients attended socialising visits with the physiotherapist, which were planned in a similar way to the mobilisation sessions.³⁶

3.4.3. Pharmacological interventions

The sole report incorporating a drug-based approach is a randomised, open-label, active-controlled, parallel-group prospective pilot study³⁷ focusing on studying the impact of 15 mg/day nicergoline (an ergot alkaloid derivative) and five mg/day imidapril (an angiotensin-converting enzyme inhibitor with demonstrated efficacy on ameliorating dysphagia and pneumonia) on serum levels of substance P and recurrence of pneumonia for six months in a sample of geriatric individuals with dysphagia and a prior episode of pneumonia. In the beginning of the study, the participants were assessed on dysphagia using a two-step swallowing provocation test as described by Teramoto et al.,³⁸ which was again executed four weeks into the experiment to register the evolution of swallowing function. The diagnosis of pneumonia recurrence, on the other hand, was made according to the Japanese Respiratory Society guidelines.³⁷

3.5. Applicability Of The Assessed Approaches In Medical Practice

The tools referred in the assessment category ranged from imaging techniques^{9, 17} and swallowing tests²²⁻²⁴ to electrophysiological studies,²⁵ clinical scales,^{11, 18-21} and multidisciplinary approaches.²⁶

The studies^{9, 17} referring to the VFSS intended to describe the mechanisms of dysphagia in order to relate them to the impact of potential conditioning factors⁹ and the expected course of the disease,¹⁷ and were indeed successful in doing so.

Other reports^{11, 18} included in the review handled a combination of both imaging techniques and clinical questionnaires. In one of these studies,¹¹ the FEES was successfully employed in each participant, revealing an almost universally dysphagic sample, a result which overlapped with the ASHA-NOMS classification, but that was not reproduced by the MD Anderson Dysphagia Inventory or the mealtime observation, since both reported much lower prevalences of OD.¹¹ Similarly, in another study,¹⁸ the results on the National Institutes of Health-Speech Pathology Swallowing Questionnaire were not able to predict the swallowing alterations visualised in the ultrasound swallow study or the modified barium swallow study.¹⁸

Contrarily, the medical doctor-administered mMASA protocol was effectively applied to Ji and colleagues'¹⁹ study sample, producing results that consistently matched with the ones on the VFSS's PAS,¹⁹ while Simpelaere and colleagues²⁰ showed that the OHAT was an accessible and viable oral health screening protocol, due to its considerable overlap in inter-rater, test-retest and intra-rater variability.²⁰ Conversely, Hind and colleagues²¹ reported a variable accuracy in speech-language pathologists' PAS scores in comparison with medical experts' classifications on that scale, in spite of the fact that speech-language pathologists were expressively able to detect aspiration.²¹

Furthermore, swallow tests were used in different ways throughout the studies. The V-VST was tested in an ambulatory care setting with a 96% success rate and it reported a very high prevalence of OD in the sample,²² whereas an original protocol that comprised the combination of a water swallowing test with the trial of different food textures showed a sensitivity of 95% and a specificity 50% in comparison with the results of the FEES.²³ Another water swallow test was used in a study focusing on prognostic factors of individuals with dementia hospitalised due to AP, revealing a nearly ubiquitous prevalence of OD among assessed subjects; however, almost half of the study's population could not be screened as several patients were either assumed beforehand to have OD or they could not cooperate with the research team largely owing to cognitive impairment.²⁴

Additionally, the non-invasive electrophysiological tests conducted by Seçil and colleagues²⁵ were successfully carried out in each participant, demonstrating a 75% prevalence of OD among AD patients.²⁵ Finally, Arahata and colleagues²⁶ showed that the subjects who went through comprehensive geriatric assessment provided by diverse healthcare professionals

presented better recovery rates and were more likely to be referred for a greater number of diagnostic interventions.²⁶

On the other hand, the articles included in the interventional category mainly dealt with enteral nutrition,²⁷⁻³² compensatory mechanisms to overcome dysphagia³³⁻³⁶ and pharmacological approaches.³⁷

Fundamentally, none of the studies²⁷⁻³⁰ reported remarkable advantages resulting from PEG tube feeding in patients with dementia, since they associated the procedure with higher mortality rates²⁸⁻³⁰ and absent functional status enhancement.^{27, 28} In the study in which NTF and CHF were compared,³¹ NTF appeared to be a risk factor for pneumonia in patients with both OD and behavioural feeding problems, although mortality rates did not meaningfully differ between the two modalities. Conversely, gastrostomies and NTF were significantly related to both mortality and AP in another report.³²

Moreover, CDPwTL was compared with the use of thickened liquids (HTL and NTL) with neutral head position in two articles: in one³³ of them, a substantial proportion of aspiration among patients with dementia regardless of the chosen procedure was reported, but still HTL obtained better outcomes in comparison with the remaining interventions, a result which was, nonetheless, significantly less meaningful when this procedure was performed last in the sequence of interventions,³³ whereas, in the other article,³⁴ no intervention was significantly superior, despite the better adherence of patients with dementia only to HTL.³⁴ In addition, in the study involving the Candy Sucking Test,³⁵ participants were all able to complete the intervention and they were categorised into two groups according to whether they were capable of producing an increase of over 0.1 grams in the weight difference of the lollipop per minute of sucking: the increase group, for the subjects who were able to do it, and the non-increase group, for the ones who were not able to achieve this. There was no statistically meaningful difference between both groups before and after the training protocol in any of the measured outcomes, however, the mean body mass index (BMI) difference before and after the test was statistically significant between both groups, with the increase group showing an overall mean body mass gain and the non-increase group revealing an overall body mass loss.³⁵ Lastly, in the study³⁶ concerning the effects of cervical spine mobilisation, 90% of participants successfully completed the program, meaningfully enhancing swallowing capacity.³⁶

Finally, in the article³⁷ in which the effects of two drugs were compared, dysphagia significantly improved in participants with dementia under nicergoline, but not under the imidapril regimen.³⁷

4. Discussion

This scoping review outlined several ways of providing palliative care in the context of dementia by analysing various practices regarding the assessment and management of OD. The 23 included studies cover a considerable variety of approaches, working with different research methods and outcome measures. In fact, the strategies involved in the identified sources of evidence range from evaluative measures, which encompass imaging techniques, swallowing studies, electrophysiological studies, clinical scales, and comprehensive geriatric assessment, to interventional approaches, which include alternatives to oral intake, texture-modified diets, compensatory mechanisms, and pharmacological therapies. Within the evaluative group, the most predominantly explored topics were clinical scales and swallowing studies, while alternative feeding routes and consistency-modified food/compensatory mechanisms were the main focus of the interventional group.

Admittedly, one third of the reports^{9, 17, 24, 25} within the assessment category did not truly focus on judging the reliability of the adopted approaches, since, in reality, they merely confined themselves to applying these tools for the sake of estimating the prevalence of OD in the respective samples, as these studies were developed from a starting point in which the viability of the evaluative instruments was not called into question, but rather tacitly recognised. Nevertheless, in the remaining reports within this group, the research teams committed to comparing the results from the instruments at issue with the results from validated techniques, or to comparing the differences and similarities between the discernment of different healthcare providers when using the same evaluative tools. Clinical scales manifested diverse outcomes, with some results suggesting them to be adequate screening devices and others proposing the opposite. More concretely, the ASHA-NOMS classification, the Dysphagia Outcome Severity Scale and the mMASA reported similar results to the ones obtained with the validated instruments with which they were compared,^{11, 19, 22} whereas the MD Anderson Dysphagia Inventory and the National Institutes of Health-Speech Pathology Swallowing Questionnaire did not produce outcomes as reliable as these.^{11, 18} The OHAT and the PAS were, on the other hand, tested in a different light, as the OHAT was evaluated on its feasibility, inter- and intra-rater agreement and test-retest classifications,²⁰ whereas the scores on the PAS were compared between medical experts and speech pathologists.²¹ While the OHAT obtained generally positive results, propounding its inclusion in comprehensive clinical swallowing examinations,²⁰ speech pathologists appeared not to employ the PAS with a compelling degree of accuracy, which

emphasises the need for more extensive training of these healthcare professionals.²¹ Swallowing studies also retrieved inconsistent results, since the V-VST was considered to be reliable in an ambulatory setting,²² while the “Albertinen Dementia Dysphagia Screening” protocol enjoyed a convincing sensitivity, but a discouraging specificity.²³ The results of the comprehensive geriatric assessment²⁶ were, however, deemed as promising, as it conduced to better recovery rates.

Within the interventional group, the results overlapped considerably more, as none of the studies suggested substantial improvement in quality of life or survival of patients with dementia referred for PEG tube placement.²⁷⁻³⁰ Furthermore, both NTF^{31, 32} and gastrostomies³² were considered risk factors for AP, but the influence of these enteral nutrition modalities on mortality was conflicting, with one of the studies suggesting that NTF does not jeopardise the survival of patients with dementia when compared with oral intake,³¹ and the other one reporting a higher mortality rate among patients under either NTF or gastrostomy tube feeding in comparison with oral nutrition.³² Texture-modified diets also conveyed mixed outcomes, since they did not tackle aspiration, which was still prevalent in a substantial portion of patients even after introducing these measures.³³ Still, in one report,³³ HTL was deemed as the most successful approach in comparison with NTL and CDPwTL, while another study was not able to demonstrate the superiority of any of these interventions, despite showing a better adherence to HTL among patients with dementia.³⁴ Moreover, the Candy Sucking Test gave rise to some weight gain in the increase group, in spite of the reduced number of subjects within it,³⁵ while cervical spine mobilisation was able to significantly increase the dysphagia limit.³⁶ At last, nicergoline increased serum levels of substance P in patients with dementia, which lead to a functional improvement in swallowing function.³⁷

Although there is at least one systematic review focusing on the assessment and management of OD in patients with dementia,⁶ this is possibly the first scoping review on the topic and likely the only review with this specific concern in the last 11 years.⁶ Moreover, the present review followed the PRISMA-ScR guidelines,¹⁴ which enriches this article with methodological rigor. However, the inclusion of solely two databases and the use of research articles only may have limited the range of selection of existing evidence sources within a theme which is already in its own nature characterised by a paucity of available information. Incidentally, an intervention review by Cochrane on the use of a texture-modified diet on dementia-related swallowing disorders³⁹ merely included two reports,^{33, 34} both of which were also incorporated into this study. Additionally, as the present scoping review was not intended to measure the effectiveness of the included interventions, a critical appraisal was not conducted, and thus recommendations regarding their application in a clinical setting are beyond the scope and the

objective of this study. Overall, a considerable number of the included reports contained a small sample size, with some interventions being employed in one sole study, which should prompt more research on this area. Furthermore, although swallowing disorders inherent to different dementia syndromes share various characteristics, they do not arise from the same pathophysiological mechanisms, and that is why more studies should focus on particular subsets of dementia, as several articles included a combination of diverse dementia syndromes, or collectively involved patients with dementia and subjects with other disorders. In fact, various studies did not even mention the dementia syndrome being handled in the research, which represents insufficient granularity in the available evidence sources.

In some of the included studies,^{24, 26, 28} signs suggestive of malnutrition, specifically hypoalbuminemia, were recognised as a major risk factor for mortality^{24, 28} or poor functional status²⁶ in dysphagic individuals with dementia, which should also reinforce additional research on providing an adequate nutritional intake to these patients. The 2024 update of the European Society for Clinical Nutrition and Metabolism guideline on nutrition and hydration in dementia⁴⁰ even accentuates the need for regular screening of nutritional status deterioration with, for instance, the Mini Nutritional Assessment Short-Form.⁴⁰ This guideline also highlights the importance of screening for low-intake dehydration in the context of dementia, preferably by measuring or calculating the level of serum osmolality.⁴⁰

Ultimately, the truth of the matter lies in the fact that the mealtime transcends the acts of eating, mastication, and swallowing, as food, distractors (such as background noise or movement), the patients' behaviour, alertness and perception, the surrounding people, and the relationships cultivated between these people and the patients, among countless other elements, all play a relevant part at the table.⁴¹ In short, the nutritional management of individuals with dementia should be multidisciplinary and individualised, as the patients' preferences are key in overcoming such issues.⁴⁰ Therefore, care providers should pay special attention to the patients' habits, cultural and religious backgrounds, and preferences for food, drinks, eating utensils, meal structure and commensals.⁴⁰ Other recommendations pertaining to feeding and hydrating subjects with dementia include setting the meal in a stimulant and social environment, opting for an attractive variety of food and liquids, supplying mealtime assistance to the patients, implementing exercises to sustain the swallowing function, providing the patients at risk for malnutrition with enriched ingredients and oral supplements, considering a consistency-modified diet in patients with OD, proposing enteral or parenteral nutrition according to the patients' needs and preferences, avoiding the use of orexigenic compounds, and opting for hypodermoclysis in case of mild to moderate low-intake dehydration.⁴⁰ As a consequence of the multitude of aspects

affecting the mealtime, more emphasis should be placed on efforts to prioritise extensive caregiver education on communication and involvement of the patient in the meal, together with institutional measures, as a means to tackle these issues.⁴¹ In point of fact, in one of the included studies¹¹ in the review, only about half of caregivers managed their patients' condition with appropriate measures according to the Caregiver Mealtime And Dysphagia Questionnaire,¹¹ which should draw further attention to the training that these care providers receive. As a substantial dearth of evidence on the subject of palliative care in dementia endures, more comprehensive efforts should be made to develop an orientation protocol directed at improving quality of life, strengthening functional independence and bolstering comfort measures in the context of these syndromes.⁴²

5. Conclusions

OD is prevalent in patients with dementia, potentially giving rise to life-threatening complications in subjects under particularly frail circumstances. The lack of high-quality evidence on the assessment and management of this symptom in the context of dementia should bolster further research on the topic so as to create guidelines for adequate palliative care of these individuals. Until then, gold-standard methods of evaluating OD should continue to be performed in these patients. As several screening instruments and therapeutic strategies (namely compensatory swallowing mechanisms and pharmacological therapies) show promising results in clinical, institutional, and residential settings, their use should be encouraged and continuously tested in studies with larger samples and ideally focusing on specific subsets of dementia.

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Figures

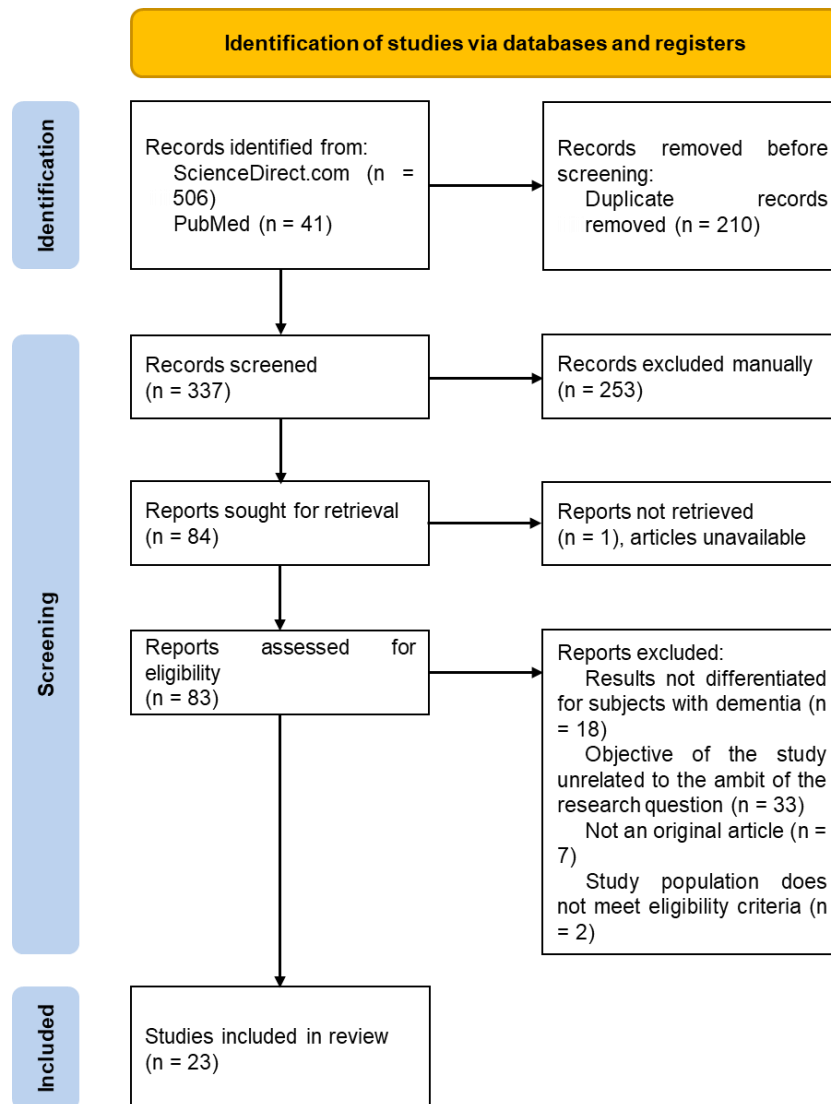


Figure 1. PRISMA-ScR Flow Chart

Tables

Table I. Evaluative Studies: Sample Descriptives

Author (Year — Country)	Methodology	Description Of Population (Sex Ratio — Mean Age $\pm$ SD)	Dementia Syndrome
Miarons et al. ⁹ (2018 — Spain)	Quantitative (observational, retrospective, cross-sectional study)	114 patients with dementia, aged at least 75 years, with signs of impaired swallowing efficacy and/or safety on the VFSS, 39 of which under antipsychotics (65F:39M — 82.5 $\pm$ 7.8) 29 patients without dementia and with VFSS-confirmed OD (19F:10M — 83.5 $\pm$ 7.5)	VD, degenerative dementia, and mixed dementia (patients with cognitive impairment also included in the sample)
Yamamoto et al. ¹⁷ (2010 — Japan)	Quantitative (prospective cohort study)	135 individuals with Lewy body disease, 45 of which with LBD, who were orally fed at the time of the study's inception and taking levodopa (59F:76M — 70.3 $\pm$ 7.8)	LBD: dementia with Lewy bodies (DLB) and PD dementia
De Stefano et al. ¹¹ (2020 — Italy)	Quantitative (retrospective cross-sectional study)	52 patients aged at least 65 years, with minimal to mild cognitive deterioration and suspected OD (25F:27M — 75.9 $\pm$ 8.6)	VD, AD, DLB, FTD, and primary progressive aphasia (patients with mild cognitive impairment also included in the sample)
Grunho et al. ¹⁸ (2015 — USA)	Quantitative (observational case-control study)	24 consecutive patients with CBS (15F:9M — 66.7 $\pm$ 10.0) 28 age- and sex-matched healthy controls (14F:14M — 63.9 $\pm$ 11.8)	CBS

Table I. (Continuation) Evaluative Studies: Sample Descriptives

Author (Year — Country)	Methodology	Description Of Population (Sex Ratio — Mean Age $\pm$ SD)	Dementia Syndrome
Ji et al. ¹⁹ (2019 — ROK)	Quantitative (retrospective, cross-sectional, clinical study)	25 right-handed patients with dysphagia and mild to moderate dementia, recruited from a rehabilitation clinic (13F:12M — 76.92 $\pm$ 7.91)	AD, and VD
Simpelaere et al. ²⁰ (2016 — Belgium)	Quantitative (multicentre cohort study)	132 patients recruited from an acute geriatric department, two assisted living facilities, and three nursing homes, 75 of which with cognitive impairment (95F:37M — mean age not specified)	Not specified
Hind et al. ²¹ (2009 — USA)	Quantitative (randomised clinical trial)	669 individuals with dementia and/or PD, manifesting with thin liquid aspiration on VFSS in the absence of compensatory mechanisms	AD, VD, PD dementia, and others not specified
Michel et al. ²² (2018 — France)	Quantitative (prospective, monocentric, cohort study)	117 community-dwelling patients aged at least 70 years with dementia, able to effectively cough and to voluntarily swallow (77F:40M — 84.5 $\pm$ 5.1)	AD, and mixed dementia
Rösler et al. ²³ (2015 — Germany)	Quantitative (cohort study)	161 hospitalised geriatric patients with dementia (117F:44M — 82.4 $\pm$ not specified) 30 controls (21F:9M — 79.3 $\pm$ not specified)	AD, VD, FTD, LBD, PD dementia, progressive supranuclear palsy and dementia in multiple sclerosis

Table I. (Continuation) Evaluative Studies: Sample Descriptives

Author (Year — Country)	Methodology	Description Of Population (Sex Ratio — Mean Age $\pm$ SD)	Dementia Syndrome
Bosch et al. ²⁴ (2012 — Spain)	Quantitative (prospective cohort study)	120 consecutive patients with dementia, aged at least 75 years old, hospitalised due to AP (61F:59M — 86 $\pm$ 9 years old)	Not specified
Seçil et al. ²⁵ (2016 — Türkiye)	Quantitative (cross-sectional study)	40 AD patients aged between 55 and 86 years, who were under acetylcholine esterase inhibitors, memantine or combination therapy (29F:11M — 74.57 $\pm$ 7.33) 20 age-matched healthy controls (15F:5M — 73.45 $\pm$ 7.17 years old) 20 young healthy controls (9F:11M — 31.2 $\pm$ 4.49)	AD
Arahata et al. ²⁶ (2017 — Japan)	Quantitative (single-arm, non-randomised trial with historically controlled patients for comparison)	Intervention group: 90 patients aged at least 70 years, with dementia and decreased oral intake, dependent on artificial nutrition and/or hydration (54F:36M — 88.4 $\pm$ 6.9) Historically controlled group: 124 patients under the same conditions (74F:50M — 88.2 $\pm$ 6.8)	Not specified

Abbreviations: AD — Alzheimer's Disease; DLB — Dementia With Lewy Bodies; F — Females; FTD — Frontotemporal Dementia; LBD — Lewy Body Dementia; M — Males; OD — Oropharyngeal Dysphagia; PD — Parkinson's Disease; ROK — Republic Of Korea; SD — Standard Deviation; USA — United States Of America; VD — Vascular Dementia; VFSS — Videofluoroscopic Swallowing Study

Table II. Evaluative Studies: Outcome Description

Study	Outcome Measures	Main Findings
Miarons et al. ⁹	VFSS, and PAS	Roughly 9 in every 10 subjects with dementia with impaired swallowing efficacy and just under three quarters with impaired safety Laryngeal vestibule closure time meaningfully belated in subjects with dementia under antipsychotics compared with individuals without dementia In patients with dementia, laryngeal vestibule closure time longer than 0.340 seconds was associated with unsafe swallow with 71% accuracy
Yamamoto et al. ¹⁷	VFSS, Hoehn and Yahr stage, pneumonia onset, and discontinuance of sustained oral intake	53 participants developed pneumonia 21 patients abandoned oral intake Aspiration was associated with worse outcomes Hoehn and Yahr VFSS stage was a significant risk factor for cessation of oral intake Cumulative rate of pneumonia onset significantly higher among subjects with aspiration Cumulative rate of sustained oral intake significantly diminished in patients with LBD
De Stefano et al. ¹¹	FEES, PAS, ASHA-NOMS scale, MD Anderson Dysphagia Inventory, Caregiver Mealtime and Dysphagia Questionnaire, and MMSE	Only 2 patients with a PAS score of 1, overlapping with ASHA-NOMS scale, which indicated only 2 patients with grade 7 OD (without swallowing disturbances) MD Anderson Dysphagia Inventory showed swallowing problems in slightly under a quarter of subjects Just over half of cases showed reasonable management by caregivers in the Caregiver Mealtime and Dysphagia Questionnaire Speech pathologists able to identify swallowing disturbances during mealtime observation in just over four out of five subjects Lower MMSE scores significantly associated with higher dysphagia severity as assessed by the ASHA-NOMS scale

Table II. (Continuation) Evaluative Studies: Outcome Description

Study	Outcome Measures	Main Findings
Grunho et al. ¹⁸	National Institutes of Health-Speech Pathology Swallowing Questionnaire, ultrasound swallow study, modified barium swallow study, and speech evaluation	59% of CBS patients with abnormal dry swallow duration and 10% with abnormal wet swallow duration in the ultrasound evaluation Modified barium swallow study with abnormalities in every patient but one “Piecemeal deglutition” distinguishing of CBS patients (excessive number of lingual movements triggering various swallows needed to wash out one single bolus) Alterations in imaging techniques not predicted by questionnaire
Ji et al. ¹⁹	mMASA, VFSS, MMSE, Montreal Cognitive Assessment, Global Deterioration Scale, Clinical Dementia Rating, and modified Barthel Index (BI)	mMASA findings consistent with the VFSS evaluation (namely with the classifications on the PAS) and correlated with cognitive function of the participants (specifically with the “Judgment & Problem Solving” and the “Community Affairs” subscales of the Clinical Dementia Rating)
Simpelaere et al. ²⁰	Modified OHAT (feasibility and reliability)	OHAT classifications only significantly different in the items “saliva” (between subjects in hospitals and in nursing homes) and “oral cleanliness” (between patients in nursing homes and in assisted living facilities) Inter-rater agreement nearly faultless in seven of the eight groups of the OHAT (coincident in the “dental pain” group) Test–retest scores expressively overlapped in the “natural teeth” and “dentures” categories Very good intra-rater percentual agreement in every category, except the “gums and tissues” subset Speech pathologists generally considered the OHAT an accessible and not time-consuming tool

Table II. (Continuation) Evaluative Studies: Outcome Description

Study	Outcome Measures	Main Findings
Hind et al. ²¹	PAS	Speech-language pathologists and experts tended to agree to a very high extent on aspiration evaluation for each intervention (CDPwTL, HTL and NTL) regardless of swallow condition (3 mL or cup), and to a high extent for both the 3 mL method and the cup method Variable accuracy of speech-language pathologists' PAS scores compared with experts' classifications Main divergence concerned the speech-language pathologists' penetration scores while assessing HTL
Michel et al. ²²	V-VST, Dysphagia Outcome Severity Scale, and geriatric parameters	OD prevalence of 86.6% as assessed by the V-VST 3.1% of patients with safety impairment, 53.6% with impaired swallowing efficacy, and 43.3% with both V-VST success rate of 96%, taking an average of 8.7 ± 2.7 minutes to complete the test OD prevalence of 91.1% according to the Dysphagia Outcome Severity Scale, in which the most common grades were level 5 (mild dysphagia) and level 4 (mild to moderate dysphagia) No significant connection between the MMSE grade and the score on the Dysphagia Outcome Severity Scale
Rösler et al. ²³	FEES, signs of aspiration, and swallowing latency	Higher rates of signs of aspiration in patients with dementia compared with the controls Aspiration more common with water, followed by apple slice and, lastly, apple puree Inverse association between MMSE scores and suspected rate of aspiration, and MMSE scores and latency until the first swallow of the apple puree "Albertinen Dementia Dysphagia Screening" with sensitivity of 95% and specificity of 50% compared with FEES

Table II. (Continuation) Evaluative Studies: Outcome Description

Study	Outcome Measures	Main Findings
Bosch et al. ²⁴	Water swallow test, medical history, Charlson Comorbidity Index (CCI), medication, and mortality	Aspiration very common in the individuals who undertook the water swallow test Repeat AP associated with use of liquid-thickeners and less use of ACE inhibitors compared with patients with an inaugural episode of AP No influence of tube feeding or help in feeding in repeat AP Lower albumin serum levels significantly related to six-month mortality 52 patients not assessed with the water swallow test
Seçil et al. ²⁵	Dysphagia limit, sequential water swallowing, heart rhythm, respiratory rate, and sympathetic cutaneous responses	Three quarters of AD participants had dysphagia Dysphagia progresses alongside AD evolution (in a continuum ranging from subclinical dysphagia to overt dysphagia, and, ultimately, to swallowing apraxia) Significant decrease of mean volume in the dysphagia limit test in participants with AD Swallowing and apnoea periods assessed in the sequential water swallowing test significantly protracted in age-matched controls and even longer in participants with AD
Arahata et al. ²⁶	Withdrawal from artificial nutrition and/or hydration, survival at one year after recovery (no longer dependent on artificial supplements for at least 7 days), overall survival, recovery rate	Significantly more prevalent AP and mortality in the group using enteral nutrition Number of performed diagnostic measures significantly higher in the intervention group Serum levels of albumin at baseline represented a major risk factor for independence from artificial hydration and/or nutrition Significantly higher recovery rate in the intervention group No substantial difference in proportion of hospital admissions between both groups

Abbreviations: ASHA-NOMS — American Speech-Language-Hearing Association — National Outcomes Measurement System; BI — Barthel Index; CBS — Corticobasal Syndrome; CCI —

Charlson Comorbidity Index; CDPwTL — Chin-Down Posture With Thin Liquids; FEES — Fiberoptic Endoscopic Evaluation Of Swallowing; HTL — Honey-Thickened Liquids; LBD — Lewy Body Dementia; mMASA — Modified Mann Assessment Of Swallowing; MMSE — Mini-Mental State Examination; NTL — Nectar-Thickened Liquids; OD — Oropharyngeal Dysphagia; OHAT — Oral Health Assessment Tool; PAS — Penetration-Aspiration Scale; VFSS — Videofluoroscopic Swallowing Study; V-VST — Volume-Viscosity Swallow Test

Table III. Interventional Studies: Sample Descriptives

Author (Year — Country)	Methodology	Description Of Population (Sex Ratio — Mean Age $\pm$ SD)	Dementia Syndrome
Kobayashi et al. ²⁷ (2002 — USA)	Quantitative (prospective cohort study)	58 patients initially referred to PEG feeding tube insertion: • 52 of which deemed appropriate candidates for the procedure (10 of them had with dementia) (27F:25M — 70.8 $\pm$ not specified) • 6 were deemed inappropriate (4F:2M — 65.3 $\pm$ not specified)	Not specified
Nair et al. ²⁸ (2000 — USA)	Quantitative (prospective cohort study)	55 consecutive patients with dementia and defective oral intake (41F:14M — 83.31 $\pm$ 9.76) 33 age- and sex-matched controls (21F:12M — 80.4 $\pm$ 8.02)	AD, VD, and other unspecified degenerative aetiologies
Sanders et al. ²⁹ (2000 — UK)	Quantitative (retrospective cohort survival analysis)	361 consecutive patients with PEG feeding tubes from two British hospitals (sex ratio and mean age not specified)	Not specified
Sanders et al. ³⁰ (2002 — UK)	Quantitative (prospective cohort study)	Hospital A: 31 patients with dysphagia, unable to meet nutritional requirements, referred for PEG tube insertion, 6 of which with dementia (16F:15M — mean age not specified) Hospital B: 84 patients under the same circumstances, 18 of which with dementia (40F:44M — mean age not specified)	Not specified

Table III. (Continuation) Interventional Studies: Sample Descriptives

Author (Year — Country)	Methodology	Description Of Population (Sex Ratio — Mean Age $\pm$ SD)	Dementia Syndrome
Yuen et al. ³¹ (2022 — PRC)	Quantitative (retrospective cohort study)	764 patients with advanced-stage dementia, aged at least 60 years, referred for tube feeding and admitted to two geriatric convalescence centres between 2015 and June 2019 (467F:297M — 88.8 $\pm$ 7.4)	Not specified
Cintra et al. ³² (2014 — Brazil)	Quantitative (prospective, non-randomised and unblinded cohort study)	67 patients aged at least 60 years, with dementia and OD, 36 of which under oral nutrition and 31 under enteral nutrition (57F:10M — 84.79 $\pm$ 7.0)	AD
Logemann et al. ³³ (2008 — USA)	Quantitative (randomised clinical trial)	711 patients aged 50 to 95 years, with an established diagnosis of dementia, PD, or both, of which 483 had dementia with or without concomitant PD (213F:498M)	AD, VD, and others not specified
Robbins et al. ³⁴ (2008 — USA)	Quantitative (randomised, controlled, parallel-design trial)	515 patients recruited from 47 hospitals and 79 subacute care facilities, aged at least 50 years, and aspirating on thin liquids, 361 of which with dementia and 154 with PD without dementia (156F:359M)	AD, VD, PD dementia, and others not specified
Kawano et al. ³⁵ (2018 — Japan)	Quantitative (non- randomised clinical trial)	25 geriatric patients with dementia (20F:5M — 90.8 $\pm$ 6.7)	Not specified

Table III. (Continuation) Interventional Studies: Sample Descriptives

Author (Year — Country)	Methodology	Description Of Population (Sex Ratio — Mean Age $\pm$ SD)	Dementia Syndrome
Bautmans et al. ³⁶ (2008 — Belgium)	Quantitative (randomised controlled trial with a crossover design)	15 nursing home residents with severe AD, paratonia with altered neck posture, and dysphagia, aged between 77 and 98 years (9F:6M — mean age not specified)	AD
Nakashima et al. ³⁷ (2011 — Japan)	Quantitative (randomised, open-label, active- controlled, parallel-group prospective pilot study)	60 subjects aged at least 65 years with dysphagia and a history of pneumonia in the 2 years prior to the study, 23 of which with dementia (14F:46M — mean age not specified)	Not specified

Abbreviations: AD — Alzheimer's Disease; F — Females; M — Males; OD — Oropharyngeal Dysphagia; PD — Parkinson's Disease; PEG — Percutaneous Endoscopic Gastrostomy; PRC — People's Republic Of China; SD — Standard Deviation; UK — United Kingdom; USA — United States Of America; VD — Vascular Dementia

Table IV. Evaluative Studies: Outcome Description

Study	Outcome Measures	Main Findings
Kobayashi et al. ²⁷	CCI, BI, follow-up questionnaire on survival and functional status	Impossibility to regain oral intake and negative evolution of BI in patients with dementia Dementia not associated with survival time
Nair et al. ²⁸	Motive behind hospitalisation, nutritional parameters, Karnofsky performance status, comorbidities, and complications	Patients with significantly higher mortality compared with controls Serum albumin levels less than or equal to 2.8 g dL ⁻¹ , which were significantly more frequent among patients, stood out as the sole predictor of worse six-month survival rates in the patient group Serum albumin levels greater than 2.8 g dL ⁻¹ were the most accurate predictor of survival past the follow-up period No reports of performance status enhancement at 6 months after the procedure
Sanders et al. ²⁹	Survival	Overall one-month mortality rates after PEG tube insertion of 28% Subjects with dementia show even worse outcomes: over half of them died after 1 month and 90% died after 1 year
Sanders et al. ³⁰	Indication for PEG tube insertion, and survival	PEG tube insertions had been on the rise in both hospitals in every year leading up to the study Following the implementation of guidelines in hospital A, the number of interventions fell by 20, while, in hospital B, the rise in number of procedures persisted Mortality subsided in hospital A in comparison with hospital B, but the difference was not significant Patients with dementia who underwent the procedure stood out as the group with the highest mortality rate (88% by the end of the follow-up period)

Table IV. (Continuation) Evaluative Studies: Outcome Description

Study	Outcome Measures	Main Findings
Yuen et al. ³¹	One-year survival, and pneumonia incidence	No meaningful difference in survival between both routes Survival not dependent on feeding problem type (OD, behavioural feeding issues, or both) NTF not a meaningful predictor of survival and considered a substantial risk factor for pneumonia in subjects with both OD and behavioural feeding issues, but not in individuals with OD only or behavioural feeding issues only Among individuals who survived to discharge, the CHF group manifested lower pneumonia rates Sex, AP prior to choice of feeding modality and BMI were also deemed as meaningful predictors of pneumonia
Cintra et al. ³²	Survival rate, pneumonia incidence, and hospital admissions	AP and mortality significantly higher in enteral route group No substantial difference in proportion of hospital admissions between both groups
Logemann et al. ³³	VFSS	Over 50% of dementia patients aspirated on all measures Aspiration significantly more common in individuals with dementia regardless of intervention Best results with HTL, followed by NTL and CDPwTL Patients with dementia significantly aspirated more on HTL when it was last in the sequence instead of first Patients solely with dementia more likely to aspirate on NTL the higher their Dementia Severity Score
Robbins et al. ³⁴	Pneumonia diagnosis (chest radiography or fulfilment of at least three respiratory criteria, and mortality	Patients with dementia showed less adherence to CDPwTL and similar adherence to NTL when compared with patients with PD without dementia Adherence to HTL was best in individuals with dementia without PD, followed by patients with PD without dementia and participants with both PD and dementia Not possible to validate the superiority of any intervention Dehydration and cumulative incidence of pneumonia more frequent under thickened liquids than CDPwTL

Table IV. (Continuation) Evaluative Studies: Outcome Description

Study	Outcome Measures	Main Findings
Kawano et al. ³⁵	Candy Sucking Test, MMSE, BI and BMI	No significant difference in any outcome measure between the increase group and the non-increase group before and after the training Candy Sucking Test values prior to training significantly lower in the increase group in comparison with the other group Meaningful changes in BMI before and after training in each of the two groups (rising in the increase group and decreasing in the non-increase group)
Bautmans et al. ³⁶	Feasibility of sessions of cervical spine mobilisation, hostility, and complications), maximum swallowing volume in a single movement, and control sessions of socialising visits	90% of patients successfully finished the cervical spine mobilisation program The first session of mobilisation was successful in all patients and only 5 follow-up sessions were unsuccessful (either on account of hostility evinced by the patient or illness) No complications were registered Both one session of cervical spine mobilisation and one week of therapy were enough to meaningfully enhance swallowing capacity, which significantly contrasted with the control sessions, as they did not result in any significant changes
Nakashima et al. ³⁷	Two-step swallowing provocation, ³⁸ serum levels of substance P, and recurrence of pneumonia (diagnosis based on the guidelines of the Japanese Respiratory Society)	Significantly Increased serum levels of substance P with both imidapril and nicergoline by the end of the first four weeks of treatment Participants with ameliorated dysphagia evinced meaningful elevations of serum levels of substance P Nicergoline, but not imidapril, enjoyed a more compelling efficacy concerning improvements in dysphagia in individuals with dementia No distinctive difference between both drugs in overall improvements of dysphagia and recurrence of pneumonia

Abbreviations: AP — Aspiration Pneumonia; BI — Barthel Index; BMI — Body Mass Index; CCI — Charlson Comorbidity Index; CDPwTL — Chin-Down Posture With Thin Liquids; CHF — Careful Hand Feeding; HTL — Honey-Thickened Liquids; MMSE — Mini-Mental State Examination; NTF — Nasogastric Tube Feeding; NTL — Nectar-Thickened Liquids; OD — Oropharyngeal Dysphagia; PD — Parkinson's Disease; PEG — Percutaneous Endoscopic Gastrostomy; VFSS — Videofluoroscopic Swallowing Study

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