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ORIGINAL ARTICLE/ARTICLE ORIGINAL

Dysphagia in Alzheimer's disease

Dysphagie dans la maladie d'Alzheimer

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KEYWORDS
Alzheimer's disease;
Deglutition;
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Swallowing

Summary
Objective. — To investigate electrophysiological parameters of swallowing in all stages of Alzheimer's disease.
Methods. — Forty Alzheimer's disease patients, 20 age-matched normal controls and 20 young normal controls were included. Dysphagia limit (DL) and sequential water swallowing (SWS) tests were performed. Cardiac rhythm, respiration and sympathetic skin responses were concomitantly recorded.
Results. — Dysphagia was found in 30/40 (75%) of Alzheimer's disease patients. Mean volume at the DL test was significantly reduced (16.5 ± 1.0 mL) in the Alzheimer's disease group. Swallowing and apnea times in the SWS test were significantly prolonged in elderly controls, but even longer in Alzheimer's disease patients.
Conclusions. — Alzheimer's disease patients had electrophysiological features of dysphagia, even in the early period of disease. The cortical involvement and severity of cognitive disorder can increase swallowing problems, but subclinical signs of dysphagia may be observed even in patients with mild or moderate Alzheimer's disease.

MOTS CLÉS
Déglutition ;
Démence ;
Électrophysiologie ;
Maladie d'Alzheimer

Résumé
Objectif. — Évaluer par des mesures électrophsyiologiques le temps oro-pharyngien de la déglutition dans la maladie d'Alzheimer à différents stades.
Méthodes. — Quarante patients atteints de maladie d'Alzheimer, 20 témoins normaux appariés en âge, et 20 jeunes sujets sains ont été inclus. Les tests de « limite de dysphagie » et de déglutition séquentielle d'eau ont été réalisés. Le rythme cardiaque, la respiration et les réponses cutanées sympathiques ont été enregistrées de façon concomitante.

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Résultats. — Une dysphagie a été trouvée dans 30/40 [75 %] chez les patients d'Alzheimer. Le volume moyen au test de « limite de dysphagie » était significativement réduit (16,5 ± 1,0 mL) chez les patients d'Alzheimer. Dans le test de déglutition séquentielle d'eau, les temps de déglutition et d'apnée étaient prolongés chez les témoins âgés, et de façon beaucoup plus significative chez les patients d'Alzheimer.
Conclusions. — Les patients atteints de maladie d'Alzheimer avaient des signes électrophysiologiques de dysphagie, même au début de la maladie. L'implication corticale et la sévérité des troubles cognitifs peuvent augmenter les troubles de déglutition mais des signes infracliniques de dysphagie peuvent être décelés même chez des patients ayant une forme légère ou modérée de maladie d'Alzheimer.

Introduction

Dysphagia or swallowing impairment is an important symptom in dementia. It has been estimated that up to 45% of patients with dementia have some degree of swallowing difficulties [25,51]. After 65 years, prevalence of dementia increases, and after 85 years it increases up to 30% [24,42]. Because Alzheimer's disease [AD] dementia is generally a disease of the elderly population, there are some overlaps between normal elderly and dementia groups. The subtle physiological changes in the elderly and early period of AD should be differentiated, at least regarding the peripheral aspects of oropharyngeal swallowing. Dysphagia is generally expected in moderate and late stages of AD [12,25,48]. However, it can be observed in the early period as subclinical dysphagia, which may be shown by using some swallowing test methods [26,28,44,54]. In mild to moderate AD, inappropriate eating, indifference to food and eating, choking and aspiration symptoms may occur [48]; feeding and swallowing apraxia may also be observed in AD patients [48].

Various cortical areas control oropharyngeal swallowing [23,39,50,55] and these may be affected by AD pathology, including the insula, frontal anterior cingulate cortex, primary motor and sensory motor cortical areas and supplementary motor areas [8,26,27,39]. As a result, it is commonly believed that involvement of swallowing cortical areas by the cortical pathological process of AD is the main cause of dysphagia observed in this condition.

Oropharyngeal dysphagia in AD is an important issue because aspiration during swallowing can cause aspiration pneumonia during the course of the disease. Even in the early stage of AD, patients can suffer pneumonia due to ''silent'' aspiration occurring in these patients [31]. The early clinical problem in AD patients with oropharyngeal dysphagia is subtle, such that patients may not be aware of swallowing difficulties resulting in silent aspiration. Videofluoroscopy [VFS] and fiberoptic endoscopy [FEES] are methods that can clearly demonstrate the aspiration [1,36] and are suitable for use in AD patients [32]. However, VFS and FEES need special equipments and skilled technical personnel; in addition, they may not be easy to apply in some AD patients because of communication and cognition problems [6,13]. Non-invasive and easily applicable electrophysiological swallowing tests have been developed [5,14,15,22]. Mild to moderate and even sometimes severe cognitive impairment should not be an obstacle for electrophysiological assessment. The neurophysiological test called the ''dysphagia limit'' has been used and found useful in frail elderly patients even with severe cognitive decline. Despite older age and cognitive decline, all participating patients were easily fed orally [3,7].

Our aim in this study is to investigate oropharyngeal swallowing in mild, moderate and severe stages of AD patients and compare these with age-matched elderly and young healthy participants, using electrophysiological methods. We hypothesized that AD patients may be dysphagic even in the early period of disease and that this would be not merely be due to the aging process. Although swallowing problems and dysphagia form a continuum, there are two main clinical presentations of dysphagia. The first occurs in the early period of AD when the patients are still able to collaborate in most diagnostic tests, such as swallowing EMG tests. The second type of dysphagia occurs in the later stages of AD, in patients who have severe cognitive impairment and in whom the dysphagia has an apraxic pattern.

Methods

Forty AD patients [55—86 years] diagnosed according to NINCDS-ADRDA 1984 criteria [also revised in 2011] who were able to participate in electrophysiological investigation were enrolled in this study from the AD outpatient clinic of our hospital. Twenty age-matched normal controls [AMNCs] [63—87 years] and 20 young normal controls [YNCs] [23—39 years] without any known systemic disease such as diabetes mellitus, any known malignancy or rheumatological diseases were included in the study. The AD patients were 29 women [75.34 ± 6.88 years] and 11 men [72.54 ± 8.41 years]; the mean age was 74.57 ± 7.33 years. The AMNCs were 15 women [72.4 ± 7.11] and 5 men [76.6 ± 7.09], with mean age of 73.45 ± 7.17 years. The YNCs were 9 women [29.6 ± 4.87] and 11 men [32.45 ± 3.93], with mean age of 31.2 ± 4.49 years.

Patients were classified in the outpatient clinic as having mild [$n = 11$, 61—81 years, MMSE between 20—28], moderate [$n = 20$, 57—86 years, MMSE between 12—19] or severe dementia [$n = 9$, 55—85 years, Mini Mental State Examination [MMSE] between 3—10] by using the Clinical Dementia Rating scale [CDR]. CDR 0.5—1 is accepted to be mild, CDR 2 is moderate and CDR 3 is severe. Only patients who were able to perform the test were included in the study. In the severe group, MMSE results were very low but patients were cooperative and they could perform the test. Before