Chapter 7

Is adopting the chin tuck posture when swallowing effective in patients with Huntington's disease?

Authors:
Anne-Wil Heemskerk, MSc[1,2]
Berit Verbist, MD PhD[3,4]
Raymund Roos MD PhD[1]

[1] Dept of Neurology, Leiden University Medical Centre (LUMC), Leiden, The Netherlands
[2] Huntington Centre Topaz Overduin, Katwijk, The Netherlands
[3] Dept of Radiology, Leiden University Medical Centre (LUMC), Leiden, The Netherlands
[4] Dept of Radiology, RadboudUMC, Nijmegen, The Netherlands

Submitted

Abstract

Objective

Patients with Huntington's disease suffer from dysphagia leading to aspiration. In order to prevent aspiration, it is often recommended that the patient adopts the chin tuck posture when swallowing. Whether this method is effective in preventing aspiration in these patients has, however, not been described. The goal of our study was to investigate whether the chin tuck intervention is a technique that should be recommended in HD patients in order to reduce spilling, prevent aspiration, and to reduce residue.

Methods

Forty-five patients underwent a videofluoroscopic swallowing study, which involved presenting them with 10cc of thin liquid to be swallowed with the head in normal, upright position, and 10cc thin liquid to be swallowed with the head in chin tuck position. The following features were analyzed: spilling before and during the swallow; penetration and aspiration; residue in the valleculae, and piriform sinus. The Wilcoxon signed ranks test and the Mc Nemar test were performed to investigate the differences between the two postures.

Results

All 45 HD patients underwent videofluoroscopy. Of these, 31 patients (68.9%) performed a technically good chin tuck posture, and 14 patients (31.1%) were unable to adopt the chin tuck posture when swallowing. No significant differences between the postures were found with regard to spilling, aspiration, and residue.

Conclusion

In our study population of HD patients, the chin tuck intervention was not found to be effective. We, therefore, conclude that the chin tuck procedure should no longer be advised in patients with HD.

Introduction

Huntington's disease (HD) is a neurodegenerative disease; the most prominent characteristics are disturbed movements, disturbed behaviour, and cognitive decline [1]. Almost all patients with HD suffer from dysphagia [2]. Aspiration is one of the serious consequences of dysphagia, as well as weight loss, malnutrition and dehydration. Up to 86% of HD patients die of pneumonia due to aspiration [3]. An intervention often recommended by speech-and-language therapists to prevent aspiration is to adopt the chin tuck posture during swallowing. This involves tucking the head into the neck while swallowing (Figure 1) [4], with the aim of reducing the chance of aspiration due to the change in head position [5]. When the chin is tucked to the front of the neck, the tongue-base is close to the pharyngeal back wall, the epiglottis inverts into a more protective position over the entrance to the trachea, and the size of the valleculae increases [4,6]. It has not, however, been shown that this method is effective in preventing aspiration in these patients. The aim of our study was, therefore, to investigate whether the chin tuck posture is a useful recommendation for HD patients in order to reduce spilling, prevent penetration and aspiration, and also to reduce residue after swallowing.

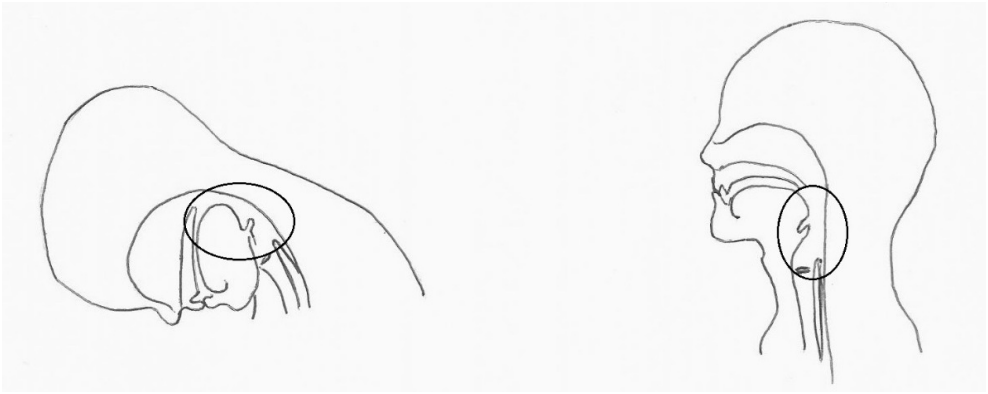

Figure 1 Chin tuck posture and normal posture
Image left: chin tuck position. Image right: normal position. The left image demonstrates that when the chin is tucked the tongue-base is close to the pharyngeal back wall, the epiglottis inverts into a more protective position over the entrance to the trachea, and the size of the valleculae increases.

Materials and Methods

Subjects

This study was part of a larger dysphagia study in HD [7] which included 45 HD patients (Table 1). Patients with a CAG repeat size ≥36 and without other diseases that could affect swallowing were included. Included patients were enrolled from all three clinical stages described by Roos [8]. In our study, the stages were defined as: stage I, patients living at home (n=13); stage II, patients living at home and having daycare (n=18); and stage III, patients living in a nursing home (n=14). Patients in stage I were consecutively selected from April 2012 until June 2012 from the outpatient Department of Neurology of the Leiden University Medical Centre (LUMC), and patients in stages II and III were consecutively selected during the same period from a Huntington Care Centre. The study was approved by the medical ethics committee of the LUMC. All patients gave their informed consent.

Table 1 Clinical and demographic information of the 45 patients with Huntington's disease

	Patients
N (males/female)	45 (23/22)
Age, yrs (SD)	53.7 (11.8)
Age at onset, yrs (SD)	43.8 (10.1)
Disease duration, yrs (SD)	9.8 (5.2)
CAG repeat length (mean ,SD)	44.2 (3.2)
N Stages of HD	
Clinical stage I	13
Clinical stage II	18
Clinical stage III	14

Values are means (SD), except for the distribution across stages.
Abbreviations: SD, standard deviation; HD, Huntington's Disease; CAG, repeat length triplets number (≥36, pathological range)

Data collection

All patients underwent a videofluoroscopic swallowing study (VFSS), which involved presenting 10cc thin liquid to be swallowed with the head in normal, upright position, and 10cc thin liquid to be swallowed with the head in chin tuck position. Water-soluble liquids were used to reduce risks when aspiration occurred. VFSS were recorded on a Toshiba Ultimax-I at 15 frames per second. Each video was analyzed in slow motion to define any swallowing disorder. The following features were analyzed: the ability to perform the chin tuck posture, spilling before and during the swallow; penetration and aspiration; residue in the valleculae, and

piriform sinus. For penetration and aspiration, the Penetration-Aspiration-Scale (PAS) was used. A score between 2-5 was defined as penetration, and 6-8 as aspiration [9]. Two raters independently analyzed the images of the VFSS: a radiologist experienced in dysphagia, and a speech and language scientist experienced in dysphagia and HD. Conclusions were reached by consensus.

Statistics

To investigate any significant difference between the normal posture and the chin tuck posture when swallowing, the Wilcoxon signed ranks test was applied for ordinal variables, and the Mc Nemar test was performed for dichotomous variables. For the statistical analyses, SPSS 22 was used.

Results

Of the 45 patients, 31 (68.9%) were able to perform the chin tuck posture, while 14 patients (31.1%) were not. On dividing the patients into the three different disease stages, it was found that in stage I, 2 (15.4%), in stage II, 4 (22.2%) and in stage III, 8 (57.1%) patients were unable to perform a good chin tuck posture. The outcomes of the measured features: spilling, penetration and aspiration, residue, and the differences between normal posture and chin tuck posture are shown in Table 2. No significant differences were found for any of the features measured.

Table 2 Videofluoroscopic findings of swallowing 10cc thin liquid with the normal posture and the chin tuck posture

	All stages				Stage I		Stage II		Stage III	
	Normal posture N=31 (%)	Chin tuck N=31 (%)	Z	p	Normal posture N=11 (%)	Chin tuck N=11 (%)	Normal posture N=14 (%)	Chin tuck N=14 (%)	Normal posture N=6 (%)	Chin tuck N=6 (%)
Spilling*										
1. before	6 (19.4)	2 (6.5)		.219	0	0	5 (35.7)	1 (7.1)	1 (16.7)	1 (16.7)
2. during	14 (45.2)	7 (22.6)		.118	4 (36.4)	1 (9.1)	7 (50.0)	4 (28.6)	3 (50.0)	2 (33.3)
PAS**	8 (25.8)	6 (19.4)	-0.690	.490	1 (9.1)	1 (9.1)	4 (28.6)	5 (35.7)	3 (50.0)	0 (0)
Residue**										
- valleculae										
no	15 (48.4)	12 (38.7)	0.000	1.000	8 (72.7)	6 (54.5)	4 (28.6)	4 (28.6)	3 (50.0)	2 (33.3)
yes	16 (51.6)	19 (61.3)			3 (27.3)	5 (45.5)	10 (71.4)	10 (71.4)	3 (50.0)	4 (66.7)
- piriform sinus										
no										
yes	17 (54.8)	18 (58.1)	-0.714	.475	10 (90.9)	8 (72.7)	4 (28.6)	7 (50.0	3 (50.0)	3 (50.0)
	14 (45.2)	13 (41.9)			1 (9.1)	3 (27.3)	10 (71.4)	7 (50.0	3 (50.0)	3 (50.0)

*Mc Nemar test (2-tailed); **Wilcoxon signed ranks test (2-tailed); Abbreviations: vs, versus; PAS, Penetration Aspiration Scale

Discussion

A videofluoroscopic study was carried out to evaluate the widely used recommended strategy in HD patients, i.e. to swallow with the chin tuck intervention. Our results show that no significant differences were found for aspiration, residue or spilling when swallowing with the head in chin tuck position compared to swallowing with the head in normal upright position. Analysis of our patient group, therefore, shows that the chin tuck intervention is not helpful. In our patient group, 14 (31%) could not perform a good chin tuck posture, especially in the last stage of the disease (n=8) when patients suffer from severe dysphagia. In our study group, the most prominent problem was that patients in the last stage did not have the ability to maintain the head position due to choreatic movements (n=4). Four other patients suffered from severe cognitive decline and therefore could not properly understand the instructions. No significant difference was found for aspiration when changing the position of the head. It is, therefore, very unlikely that the chin tuck intervention is able to reduce aspiration in this particular group of patients. Whether the chin tuck intervention reduced the risk of aspiration was also investigated in a group of Parkinson's disease (PD) patients, using VFSS [10], and comparing them to a reference group. The authors hypothesized that the chin tuck intervention should eliminate aspiration in PD, but when compared to the reference group, they found no elimination of aspiration. In fact, the PD patients even had an increased risk of aspiration when adopting this posture. Regarding the presence of residue in the valleculae and piriform sinus, our study found no significant change with the chin tuck posture. Since residue in the sinuses of the pharynx is a potential risk factor for aspiration after the swallow [6], it is of interest to know that the chin tuck posture does not reduce the risk of residue. In summary, the chin tuck intervention while swallowing is a not recommended intervention in HD patients. It does not significantly decrease the risk of spilling, penetration, aspiration, or residue.

Acknowledgements
We thank Mrs. B. Vollers for the English correction of the manuscript.

References

1. Bates G, Tabrizi S, Jones L (2014) Huntington's Disease. Fourth edition ed. New York: Oxford University Press.
2. Heemskerk AW, Roos RAC (2011) Dysphagia in Huntington's disease: a review. Dysphagia 26:1:62-66.
3. Heemskerk A, Roos RAC (2012) Aspiration and death in Huntington's disease. Plos Currents Huntington's disease 4.
4. Welch MV, Logemann JA, Rademaker AW, Kahrilas PJ (1993) Changes in pharyngeal dimensions effected by chin tuck. Arch Phys Med Rehabil 74:178–81.
5. Terre R, Mearin F (2012) Effectiveness of chin-down posture to prevent tracheal aspiration in dysphagia secondary to acquired brain injury. A videofluoroscopy study. Neurogastroenterol Motil 24:5:414-9.
6. Logemann J (2002) Slikstoornissen. Onderzoek en behandeling. Lisse: Swets & Zeitlinger.
7. Heemskerk WA, Marinus J, Roos RAC, Verbist BM. Swallowing impairment in Huntington's disease: videofluoroscopic findings. (submitted)
8. Roos RAC (2010) Huntington's disease: a clinical review. Journal of rare diseases 5:40.
9. Rosenbek JC, Robbins JA, Roecker E, Coyle JL, Wood JL (1996) A Penetration-Aspiration Scale. Dysphagia 11:93-98.
10. Logemann JA, Gensler G, Robbins J, et al. (2008) A randomized study of three interventions for aspiration of thin liquids in patients with dementia or Parkinson's disease. J Speech Lang Hear Res. 51:1:173-183.