【Original Article】

Relationship between the Score of Hasegawa's Dementia Scale-Revised and the Successful Ratio of Repetitive Saliva Swallowing Test in Dementia Patients

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Summary

The present study was performed to elucidate the relationship between the score of Hasegawa's dementia scale-revised (HDS-R) and the successful ratio of operation of the repetitive saliva swallowing test (RSST). Seventy-four patients who evaluated the degree of severity of dementia by the HDS-R were observed the swallowing, and instructed to swallow saliva just after a spontaneous swallowing. When the movement of mouth and muscular triangle was found within 10 sec after the instruction, the examinee was evaluated that the RSST was possible. The ratio of successful examinees in the RSST decreased with a decrease from the point 9 to 0 in the score of HDS-R. The score of HDS-R revealed linear relationships ($P < 0.001$) to the percent or its logit value of successful examinees in the RSST. These linear relationships suggested that the ratio of patients who can carry out the RSST is more than 50% in the HDS-R score 2 or more, and the RSST is able to be carried out for almost all (more than 90%) of dementia patients in the HDS-R score 12 or more. These HDS-R scores (2 or 12) will be a standard when paramedical stuffs carry out the RSST to dementia patients.

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Key words: dementia severity, Hasegawa's dementia scale-revised (HDS-R), repetitive saliva swallowing test (RSST), successful ratio

Introduction

Dementia is symptoms caused by diseases which alter the brain's function, such as Alzheimer's disease, vascular dementia[1)] and Parkinson's disease[2)] etc. The dementia causes a loss of memory, ability to think, abstract thought, judgment and other higher function in the cerebral cortex[3)]. The severe patient of dementia may not be able to do daily activities well with the deterioration of recognition and solving problems[3,4)]. The Hasegawa's dementia scale-revised (HDS-R), one of easy screening tests, is used effectively for testing the severity of dementia in Japan, and evaluates the dementia patient as score 0 to 20[5)]. Swallowing is caused by the reflex under control of the medulla oblongata[6)], and has been reported to be disordered in the dementia patient[7)]. As the swallowing is a function to separate the airway and the esophagus[8)], the disorder of swallowing increases the risk of aspiration[9)]. Therefore, to know the dysfunction of swallowing is thought to be very important in the care for dementia patients[10)]. The repetitive saliva swallowing test (RSST)[11,12)], the simple

swallowing provocation test (SSPT)[8,13], the water swallowing test (WST)[14,15], the video fluolography (VF)[16,17] and/or the video endoscopy (VE)[18-20] etc. are performed to evaluate the swallowing dysfunction. The SSPT, the VF and the VE can be carried out only by the medical doctor in Japan. Therefore, paramedical stuffs, the speech-language-hearing therapist (ST), the occupational therapist (OT), the physical therapist (PT) and the nurse etc., have to usually evaluate the swallowing function of patients by the RSST or the WST etc. The RSST is highly sensitive to detect the swallowing dysfunction[21]. However, Baba et al.[7] have discussed that the ability of recognition and language communication may affect to the operation of the RSST. They have indicated that scores of HDS-R was significantly lower in patients who were unable to cooperate with RSST compared with successful examinees[7], but he relationship between the severity of dementia and the successful ratio of RSST is obscure. The present study was performed to judge quickly by paramedical stuffs whether the RSST could be carried out to the dementia patient when the severity of dementia was evaluated.

Materials and Methods

Subjects

Seventy-four patients (28 males and 44 females) who entered a hospital or a geriatric health services facility was recruited. The patients with the previous speech disorder regardless of the dementia and the hearing disorder were excluded. The age of all patients was 84.4 ± 1.36 years (mean ± SE).

Estimation of the severity of dementia

The severity of the dementia was evaluated by the Hasegawa's dementia scale-revised (HDS-R) within 3 days from entering the hospital or the geriatric health services facility.

Ratio of the successful RSST

The RSST was performed at 14:00-16:30. All subjects were observed the movement of mouth and muscular triangle containing laryngeal prominence in the neck by the naked eye and instructed to swallow saliva orally as many times as they could just after a spontaneous swallowing. The time for direction [7.9 ± 0.45 sec (mean ± SEM, n = 40), not more than 13.7 sec] was evaluated from the preliminary measurement. The subjects were observed again after the direction and the occurrence of movement of the mouth and the muscular triangle for the swallowing was recorded. When the movement of mouth and muscular triangle for the swallowing was found within 10 sec after the instruction, the subject was evaluated that the RSST was possible.

Statistical Analyses

The score of HDS-R to 50% (HDS-R_{50}), 90% (HDS-R_{90}) or 100% (HDS-R_{100}) of the successful ratio of RSST was evaluated by linear regression between the score of HDS-R and the percent or its logit value[22] of successful examinees in the RSST.

Results

The RSST was possible in every dementia patient who was more than 10 points of the score of HDS-R, but the ratio of successful examinees in the RSST decreased with a decrease in the score of HDS-R (Table 1). The score of HRS-R (0 to 9) and the percent of successful examinees in the RSST revealed a linear relationship (Figure 1) and the correlation coefficient (γ) was 0.943 ($P < 0.001$). The value of HDS-R_{50}, HDS-R_{90} and HDS-R_{100} evaluated from this linear line was 1.42, 9.63 and 11.69, respectively. The score of HDS-R (0 to 9) and the logit value of percent of successful examinees in the RSST also revealed a linear relationship ($\gamma = 0.947$, $P < 0.001$) (Figure 1). The value of HDS-R_{50} and HDS-R_{90} was 1.51 and 11.07, respectively.

Discussion

An interval time of the spontaneous swallowing has been reported as approximately 30 sec in young healthy persons[23]. The interval time is prolonged in elderly persons[24]. All of subjects were instructed to swallow saliva just after a spontaneous swallowing in the present study. The time for the instruction to start the swallowing was less than 14 sec. When the movement of mouth and muscular triangle for the swallowing was found within 10 sec after the instruction, the subject was evaluated that the RSST was possible to be performed. Therefore, the movement of mouth and muscular triangle observed might not be for the spontaneous swallowing.

The RSST was able to be carried out in every dementia patient who was 10 to 19 of the score of HDS-R, but the ratio of successful examinees in the RSST decreased in the score of 9 or less (Table 1). This result agrees with a report that HDS-R scores of patients who were unable to cooperate with RSST is lower than the successful examinees[7]. A linear line ($P < 0.001$) was obtained between scores (0 to 9) of HDS-R and the percent of successful examinees in the RSST (Figure 1). The correlation coefficient (0.943) calculated from the linear line was about the same as that (0.947) between scores of HDS-R and logit values of percent of successful examinees in the RSST. Therefore, both the percent and its logit value of successful examinees in the RSST might be available to estimating the score of HDS-R to the successful ratio of the RSST. The HDS-R_{50} value evaluated from the percent and its logit value of successful examinees in the RSST was 1.42 and 1.51, respectively. These results indicate that the number of patient who can carry out the RSST is more than the number of patient who can't carry

Table 1. Scores of the Hasegawa's dementia scale-revised and the ratio of successful examinees in the repetitive saliva swallowing test.

		Successful RSST	
HDS-R	n	n	Percent
19	1	1	100
18	1	1	100
14	1	1	100
13	1	1	100
12	1	1	100
11	2	2	100
10	1	1	100
9	7	6	85.7
8	6	5	83.3
7	8	6	75.0
6	6	4	66.7
5	6	4	66.7
4	4	3	75.0
3	5	3	60.0
2	4	2	50.0
1	4	2	50.0
0	16	6	37.5

HDS-R, Hasegawa's dementia scale-revised; RSST, repetitive saliva swallowing test.

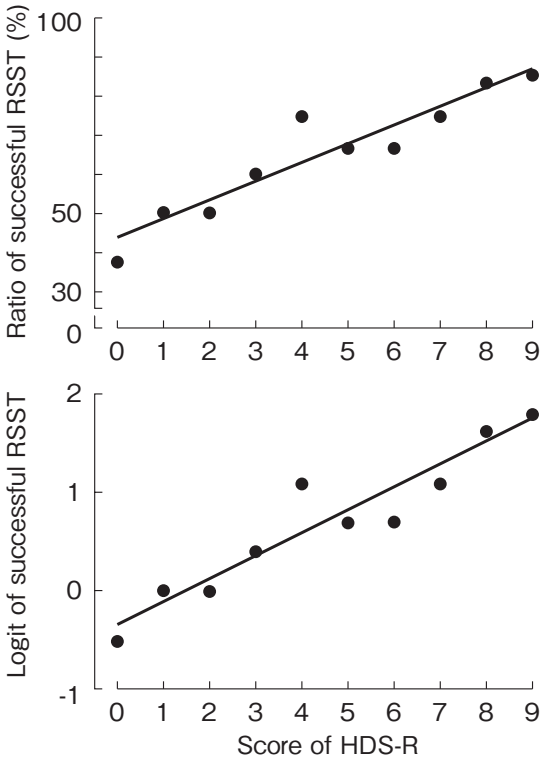

Fig.1. Relationship between scores of the Hasegawa's dementia scale-revised (HDS-R) and the ratio (upper) or its logit value (lower) of successful examinees in the repetitive saliva swallowing test (RSST).
The correlation coefficient (γ) was 0.943 (upper; $P < 0.001$) and 0.947 (lower; $P < 0.001$).

out the RSST in the HDS-R score 2 or more. The value of HDS-R_{100} evaluated from the relationship between the score of HDS-R (0 to 9) and the percent of successful examinees in the RSST was 11.69; and the value of HDS-R_{90} evaluated from the relationship between the score of HDS-R (0 to 9) and the logit value of percent of successful examinees in the RSST was 11.07. These result may suggest that the RSST is able to be carried out for almost all of dementia patients in the HDS-R score 12 or more. It will be expected that the HDS-R score 2 or 12 will be used as a standard to decide quickly whether paramedical stuffs can do RSST to the dementia patient after the HDS-R.

Ethic Approval

Ethic approval was obtained from Suzuka University of Medical Science and informed consent was obtained from all study subjects.

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改定長谷川式簡易知能評価スケールによって判定した認知症の重症度と反復唾液嚥下テストの実施可能度との関係

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要　旨

本研究は、認知症者における改定長谷川式簡易知能評価スケール（HDS-R）の得点と反復唾液嚥下テスト（RSST）の実施可能度との関係を明らかにするために行なった。74 名の認知症者は HDS-R によって認知症の重症度を判定し、自発性嚥下が見られた直後に口頭で、唾液を飲み込むように指示した。指示から 10 秒以内に嚥下が観察された場合は、RSST が可能であると判定した。RSST が可能であった割合は、HDS-R の得点が 9 点から 0 点へ低下するのに伴って低下した。この HDS-R の得点の範囲では、HDS-R の得点と、RSST の実施可能度およびその logit 値との間に直線性が認められた（いずれも $P < 0.001$）。これらの直線から、HDS-R の得点が 2 点以上の場合に RSST の実施可能度が 50%以上となること、および 12 点以上の場合には 90%以上となることが示された。この HDS-R の 2 点と 12 点という得点は、パラメディカルスタッフが認知症者に RSST を行う場合に実施可能であるかどうかを迅速に判断するための基準となることが期待される。

キーワード：認知症重症度、改定長谷川式簡易知能評価スケール（HDS-R）、反復唾液嚥下テスト（RSST）、実施可能度

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