Clinical Usefulness of Conducting Both Video Fluoroscopic Swallowing Study (VFSS) and Salivary Gland Scan (SGS) in children

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BACKGROUND

In children, swallowing difficulty occurs because of various causes, such as congenital abnormalities in swallowing-related organs, developmental delay, and abnormalities in the central nervous system. Among several subjective and objective methods for evaluating swallowing difficulty, videofluoroscopic swallowing study (VFSS) and salivagram are mainly used in children. In most cases, whether to perform both tests or only one test is determined based on the physician’s experience. We hypothesized that the combination of both VFSS and salivagram in children with swallowing difficulty would be more clinically helpful than conducting just one study.

OBJECTIVE

The aim of this study is to determine whether the use of both videofluoroscopic swallowing study (VFSS) and radionuclide salivagram was beneficial for detecting aspiration pneumonia (AP) in children with swallowing difficulty.

METHODS

From 2001 to 2016, children who underwent both VFSS and salivagram consecutively for suspected aspiration or dysphagia were included in the study. Demographic data, findings of VFSS and salivagram, and medical records were reviewed.

RESULTS

A total of 110 patients were included, and AP was present in 34 children (Table 1). 48 children showed positive aspiration findings in VFSS and 33 showed positive aspiration findings in salivagram (Table 2). The aspiration findings in both VFSS and salivagram were significantly related to AP. However, when the consistency between the two tests was calculated using kappa value analysis, the value was 0.21 (p = 0.03), indicating weak consistency. The probability of the same result (normal or abnormal) in both tests, known as “total agreement,” was 64.5% (71/110). In the group with negative aspiration finding in VFSS, 12 children (19.4%) showed positive aspiration findings in salivagram and 4 of 12 (33.3%) had AP (Table 3). In the group with negative aspiration finding in salivagram, 27 children (35.1%) showed positive aspiration finding in VFSS and 11 of them (40.7%) had AP (Table 4).

When the aspiration findings were positive in only one of the two tests, the probability of AP was 38.5%, but if aspiration findings were positive in both tests, the probability increased to 66.7% with statistical significance. If aspiration findings were negative in both tests, AP did not occur with a probability of 90% (Table 5).

DISCUSSION

Previous study compared VFSS and salivagram findings in elderly (mean age 68.8 years) with AP, and concluded that performing both tests together can be an effective way to investigate AP. To the best of our knowledge, this is the first study comparing VFSS and salivagram findings in children with swallowing difficulty.

VFSS and salivagram have the aforementioned advantages and disadvantages. However, there is also a limitation in performing the tests, especially VFSS, in children.

The total agreement of the two tests was 64.5%, which was not that high and was slightly lower than that reported in an adult study (72%), and the results of both tests showed a weak consistency with each other. Possible explanations for these results are as follows. First, salivagram and VFSS observe different types of swallowing: VFSS, the patient swallows large boluses of food material in the upright posture, whereas in salivagram, patient swallows saliva in the supine position, which occurs unconsciously and the patient comparatively swallows very little amount of food material. In addition, if aspiration occurs episodically, it may not be detected in the test results. Finally, the difficulty of performing VFSS in children might make the interpretation of the test unclear and could lead to inconsistency between the two tests.

The consistency between the two tests was not that high, and 29 children had incompatible aspiration findings in both tests. In this case, even if one test showed negative aspiration findings, it was helpful to additionally evaluate AP using another test, which showed positive aspiration findings.

Likewise, the probability of AP was significantly higher when aspiration findings were positive in both tests rather than in just one of the two tests. When both tests showed negative aspiration findings, AP did not occur with a probability of 90%. Taken together, these results suggest that conducting salivagram with VFSS may be helpful in diagnosing or excluding AP.

CONCLUSIONS

Salivagram is a valuable evaluation tool for children with swallowing difficulty. It could be helpful in assessing children at a high risk of AP, even if VFSS showed negative aspiration finding. Considering the weak consistency between the two tests and specific limitations in pediatric populations, conducting both VFSS and salivagram together is more helpful in diagnosing AP.