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研究速報

A New Technique for Proximal Esophagography and Quantitative Analysis on Pharyngeal Function

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下咽頭・頸部食道造影法と定量的検査法の開発

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Introduction

The roentgenologic examination of the upper esophagus is somewhat difficult due to the rapid passage of barium. Therefore we designed a new technique for proximal esophagography, using magnetic video disc recorder and multiformat camera (VDR-MC technique).

Methods and Results

The video signal from fluoroscopic unit is led to video disc recorder (VDR) and after the examination have been finished the recorded images are transferred into multiformat camera, and then the images are copied sequentially on a sheet film, shown as Fig. 1. VDR have a storage capacity, 600 frames per 20

Table 1 Quantitative Measurements of Pharyngeal Function by-VDR-MC technique (barium transit time in normal adults)

	measurements
A. Pharyngeal phase (from base of tongue to opening of esophageal entrance)	138 ± 29 msec
B. Relaxed time of the cricopharyngeus (from opening to re-closing in the esophageal entrance)	395 ± 34 msec
C. Total pharyngeal phase (A + B)	534 ± 37 msec
D. Transit time in the cervical esophagus	192 ± 45 msec

☆ The normal range of measurements were obtained in 18 healthy subjects (20 to less than 40 years old). Swallows of 10 to 20 ml of barium suspension were used.

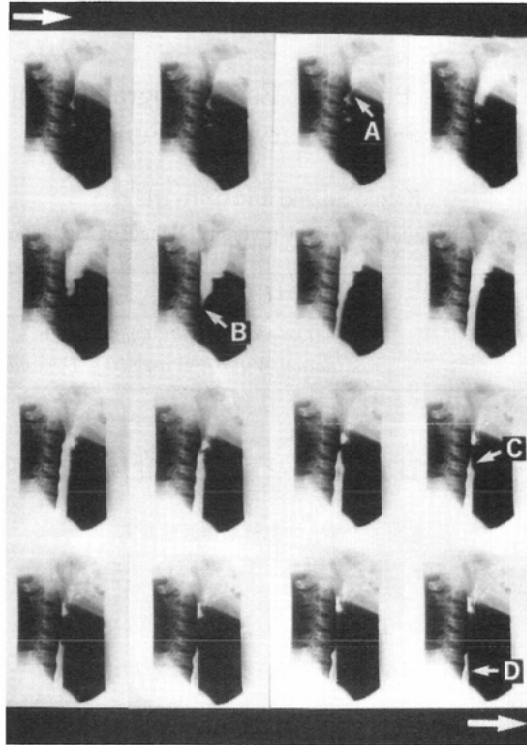


Fig. 1 Measuring points in the sequence of barium bolus during the pharyngeal stage of deglutition

seconds. The sequential pictures of barium swallowing in one deglutition movement are shown as the time-intervals of each 0.03 seconds on a sheet film. The movement of barium bolus in one deglutition will be demonstrated exactly and except any failure. This working process of VDR-MC technique is very simple and convenient, and when the reading and diagnosis of X-ray appearances, we can easily compare with the changes of each image. This is a characteristic merit of new technique.

In order to examine the function of deglutition we designed a new technique by means of the dynamic pharyngo-esophagrams as before. The recorded dynamic images are transferred into multifram camera and copied on a sheet film by the intervals of 0.03 seconds in turn. Viewing these sequential images the each measuring points are determined and the barium transit times are calculated from the number of frames, and then transferred to the time in mili second unit. According to the results of experiment, the measured values well correspond to that by EMG on the pharyngeal movement of deglutition, as shown Table 1. These quantitative analysis on the pharyngeal function and morphological diagnosis will be performed in easy procedure at the same time.

Discussion and Summary

The outline of the discussion about the advantages of this technique is as follows;

1. The performance of the examination by new technique will be done with extreme easy. A difficult examination will be performed without failure and finished in a short time successfully.
2. We can examine enoughly the patients who are not able to understand the doctor's indication, for example children and patients having hard hearing.

3. In comparison with cinefluorography or VTR method the process of examination, namely the set-up of cinefluorographic unit, development of films, patient's position, observation and copy of images and storage of film, became extremely easy.

4. A quantitative measurement on pharyngeal function was designed and the reproducibility of measurements was given proof.
