

## Analysis of the Application of Joint Image Thinking of Endoscopic Imaging System in Undergraduate Otolaryngology Teaching

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**Abstract:** Image and image data are important basis for modern medical diagnostics, and are also indispensable materials and methods in modern medical research and teaching. The author tries to use a special digital adapter with a special adapter, multi-purpose bracket and computer image workstation to form a multi-functional digital image system for clinical research and teaching. Otolaryngology is an important clinical specialty. Due to the particularity of its subject, it has different characteristics in teaching compared with other clinical specialties. Here is an endoscope for CAI (Computer Aided Instruction) in otolaryngology. Monitor the application of the system. This paper discusses the important role of endoscopic imaging system combined with image thinking in the teaching of otolaryngology in medicine. The students were divided into the control group and the experimental group. The theoretical test scores of the two groups of students and the students' interest in the teacher's lectures and satisfaction evaluation were analyzed and compared. Results The test pass rate of the test group was higher than that of the control group, and the difference was statistically significant ( $P < 0.01$ ). The satisfaction rate of the test group after the test group was higher than that of the control group, the difference was statistically significant ( $P < 0.01$ ). ). Therefore, we can conclude that the endoscopic imaging system combined with the image thinking can fully mobilize the students' image thinking in the teaching of TCM otolaryngology, stimulate students' interest in learning and improve the teaching effect.

### 1. Introduction

From the perspective of teaching, the otolaryngology discipline has the following characteristics: The content is less and less. The fifth edition of the Otolaryngology Science has 7 textbooks with more than 70 chapters, while the total teaching hours of Otolaryngology is 40 class hours, of which only 20 hours of theoretical class hours and 20 hours of clinical apprenticeships. The relative lack of theoretical class time is obvious. [1] The teaching of Otolaryngology is mainly the establishment of morphological and three-dimensional anatomical concepts. The anatomy of Otolaryngology is abstract. Because the anatomical location of the ear, nose and throat is concealed, the lumen is small, and most of its anatomy is not directly observable. The device can be seen clearly, but the inspection field and the surgical field are not easy to expose. Even in the cadaver specimens, it is not easy to see the original appearance due to dehydration and deformation, which causes many difficulties for teachers and students, so the teaching difficulty is relatively large. The lack of initiative for students to learn is due to various reasons. First, due to the influence of traditional concepts, most students think that the subjects are not important, and they are not paying enough attention to the examination department. Second, the anatomical content of Otolaryngology is abstract, can not be intuitively taught, relying solely on the descriptions and pictures on the lectures and textbooks, it is difficult for students to achieve good results by self-study; students in addition to listening to classes during class, usually take time to study Otolaryngology. Therefore, it is difficult to complete the teaching task. Only by reforming the traditional teaching mode and teaching methods can we meet the needs of the development of medical education in the new century.

## **2. Characteristics of Endoscope Monitoring System**

With the wide application of endoscopic technology in clinical medical work, endoscope monitoring systems have also become popular. The endoscope monitoring system has many advantages such as clear vision, high image resolution, TV system display, true color, real-time observation and analysis, real-time image data acquisition, storage and dynamic real reproduction. [2]The application of endoscopic techniques in the otolaryngology department is particularly well-executed, completely changing the dilemma of anatomical landmarks and disease morphological changes due to anatomical location concealment and narrow lumens. Many abstract anatomical contents It also becomes an intuitive morphological display. In the past, in the clinical apprenticeship of Otolaryngology, it was usually after the teacher found a typical case, and the students went to check to obtain the signs of the disease. The information obtained often depends on the proficiency of the students' examination methods. The degree of cooperation with patients, the final results are quite different, the teaching effect is not satisfactory, and it also significantly increases the patient's time of treatment and the pain caused by the examination. After using the endoscope monitoring system, all the signs are at a glance. At the same time, the teacher can explain in real time, and the students can ask questions on the spot, which greatly improves the teaching effect and significantly reduces the suffering of the patient. In the past, in the clinical work and teaching of Otolaryngology, the dilemma of "can only be understood, not to be able to speak" has ceased to exist, and it has provided a simple means for the accumulation of clinical data. The development of endoscopic techniques is a milestone in the development of otolaryngology. The endoscopic surveillance system has also become an excellent teaching method in otolaryngology teaching. However, in the endoscope TV monitoring system, the preservation and editing of image data are inconvenient, especially in classroom teaching, which is not convenient for quickly selecting any image for presentation, which limits its further application in otolaryngology teaching.

The specific performance is:

### **2.1 Differences between Models and Entities**

The anatomy of the ear and nose is mostly in the cavity, the structure is complex and fine, and it is impossible to teach directly. The traditional teaching is usually the first lecture, the picture and the teaching aid, and then the students check each other. Because of the different anatomical parts of each understanding, the learning effect is relatively poor.[4] Generally, when CAI technology is used, the texts and pictures of related teaching contents are matched with music and animation to make multimedia software, which really improves the teaching effect. However, because of the use of pictures and large model teaching aids, students have no concept of entities. For example, in order to teach the anatomy of the inner wall of the drum, the pictures and models that are usually used are magnified several times. Once in a real clinical internship, the true anatomical marks are not distinguished or turned a blind eye. Therefore, physical photos and X-rays must be added to the multimedia to enable students to get clear, real concepts.

### **2.2 Functional Dynamics**

Otolaryngology is a functional organ and many functions are dynamic and coherent. For example, the opening and closing process of the glottis during the pronunciation and the movement of the vocal cord surface mucosa, the middle ear transmission and the active structure of the sound reinforcement structure. To illustrate these functional activities, a simple collection of pictures, texts, and models is difficult to achieve the desired teaching effect. Therefore, CAI's multimedia must have visual animations and physical dynamic video displays.

### **2.3 Anatomical Three-Dimensionality**

The organs of the ear, nose and throat are interrelated, physiologically related, pathologically interacting and mutually complementary. The clinical teaching of Otolaryngology is mainly the establishment of morphological and three-dimensional anatomical concepts, allowing students to

understand the relationship between them. [4]Therefore, the display of layered anatomy and multi-position, multi-view images in multimedia, especially the photos of the relationship between the entities, enables students to understand the relationship between them, and finally establish a three-dimensional thinking and accurately grasp the knowledge points.

## **2.4 Knowledge Novelty**

In recent years, with the continuous development of medical science knowledge, especially the knowledge of otolaryngology has been continuously updated and expanded [6], and the latest technology, the latest therapy and the latest theory need to be introduced to students at any time. In the case that the content of textbooks is relatively lagging, and the time for students to receive education is limited, through CAI multimedia teaching, the lack of knowledge in text textbooks can be supplemented without increasing the burden on students, which broadens the horizons of students and active disciplines. The academic atmosphere makes the textbooks have the atmosphere and characteristics of the times, and better solves the contradiction between the growth of medical knowledge and the low number of teaching hours. CAI is a teaching method with great potential in the teaching of otolaryngology. However, if the multimedia software simply concentrates and optimizes the text and pictures of the textbooks, the students still get the static, non-continuous, and indirect knowledge. Similarly, it is often easy for students to disagree with multimedia teaching [3]. Therefore, high-quality CAI multimedia teaching software is based on a large number of specific, detailed, systematic clinical graphic materials. However, obtaining such information is very difficult under previous clinical working conditions.

## **3. Teaching Experiment Materials and Methods**

### **3.1 Equipment and Instruments**

OLYMPUS HD endoscopic imaging system, fiber laryngoscope, endoscope, nasal endoscope and computer PACS system.

### **3.2 Research Objects and Methods**

The students of Class 1 and Class 2 of TCM were randomly divided into the control group and the experimental group. Two classes were taught by the same batch of teachers. The control group adopted the traditional “input” teaching method, and the experimental group adopted the image. The teaching method of thinking combined with multi-functional endoscope system analyzes and compares the theoretical test scores of the two groups of students and the students' interest and satisfaction evaluation of the teachers. Among them, the theoretical test scores are assessed by the excellent rate of pass rate, and the evaluation of the teacher's lectures is conducted by questionnaire. The teaching progress and teaching instructors of the two groups are the same.

### **3.3 Evaluation of Teaching Results**

#### **3.3.1 Theoretical Test:**

A closed-book written test.

#### **3.3.2 Post-Class Questionnaire Survey Format:**

After the class, an anonymous questionnaire was used to investigate the satisfaction of the teaching effect.

### **3.4 Evaluation Criteria**

#### **3.4.1 Assessment**

The teaching and research section will be unified, with a total of 100 points: 60 points or above is passed, and 85 points or more is excellent.

### 3.4.2 After-Study Questionnaire

It mainly investigates the five aspects of the intuitive image of the teaching form, the activeness of the classroom atmosphere, whether it helps to understand and remember, whether to stimulate the interest in learning the classroom content, and whether it can mobilize the enthusiasm for learning. Each quantity is A, B, C, D, E 5 assessment levels, comprehensive B grade and above are satisfactory [2].

### 3.4.3 Statistical Methods

Statistical analysis was performed using statistical software, and t-test was used between the two groups.

## 3.5 Results

### 3.5.1 Theoretical Evaluation Results

The excellent number of the experimental group was 10 and the number of passers was 61. The number of qualified people in the control group was 1 and the number of passers was 29. The specific analysis is shown in Table 1.

Table 1 Analysis of Theoretical Assessment Results

Group	Number of people	Excellent	Pass
Test group	69	10	61
Control group	50	1	29

### 3.5.2 Questionnaire Survey

The satisfaction rate of teaching results, the test group was 89.7%, the photo group was 72.4%.

## 4. Discussion

At present, the endoscopic imaging system has been widely used in clinical practice. The image of the multi-functional endoscope imaging system is clear, the resolution is high, and the image is enlarged, which can make the cavity observation of the ear, nose and throat more clear; Photographing, storing the picture for repeated and continuous observation; in addition, it has a high-definition liquid crystal display, and can be equipped with a dedicated video capture card for real-time capture, connected with the display, can be used for teaching; finally, the photos it collects are strong. The combination of students' thinking and images makes the learning and memory process easier and more secure. Otolaryngology has special characteristics compared to other medical teachings because of its more complicated anatomical structure and its differentiation from medical routines (the syndrome of otolaryngology often needs to be combined with local examination). How to make teachers teach more clearly in undergraduate teaching, and students' learning is more understandable and interested is the goal of this research. TCM teaching has the commonality of teaching, to tell, demonstrate, reason, summarize, and finally summarize, so as to guide and stimulate students' thinking. In the course of teaching, it is necessary to display the various points in an accurate and timely manner in front of the students in an orderly manner, or in a multimedia display, or on a blackboard to facilitate the understanding and memory of the students. Different teaching methods have different adaptations, and they can be mutually compensated as appropriate [7]. The endoscopic imaging system clearly displays the anatomy. For example, ear microscopes, nasal endoscopes, and fiberoptic laryngoscopes can be connected to a computerized video system. Students can visually observe the anatomical structure of the middle ear, nasal cavity, and throat, and the adjacent relationship of some important structures. It is easier to understand. And memory. The teaching teacher can explain the anatomical features while demonstrating, making the teaching process vivid and vivid, greatly improving the students' enthusiasm for learning and learning efficiency. Second, it objectively and truly reveals the lesion. Medical teaching requires stereoscopic thinking. For students, because of the lack of relevant clinical

experience, the understanding of certain diseases is not profound enough. The endoscopic imaging system can visually reveal the lesions, which can deepen understanding and memory, and enable students to more deeply and vividly understand the recovery process of the disease, so as to better grasp the clinical knowledge. At the same time, the surgical procedure can be displayed simply and intuitively. In the classroom, the surgical methods of some diseases are broadcasted to the students for viewing, which can enable students to deepen their understanding of the disease. Timely feedback offsets and errors. At the same time, the teacher can find some flaws in the operation process by recording the operation video and the later broadcast to the students. In this way, through the video feedback, he constantly finds his shortcomings and corrects them.

It can also effectively improve the level of surgical operation of teachers themselves [4]. The traditional image thinking method of ENT can be realized through teaching wall charts, case models and multimedia. At present, the application of multi-function endoscope system to image thinking teaching has enriched and perfected the above teaching system [8]. At the same time, the endoscope system can also combine the local syndrome differentiation of TCM ENT with the overall syndrome differentiation. More vivid and vivid shows the quintessence and mystery of many students on TCM syndrome differentiation. As we all know, syndrome differentiation is the characteristic of Chinese medicine, and it is also the essence of Chinese medicine. In the process of otolaryngology teaching, the part of syndrome differentiation is the focus of teaching, and it is also difficult. How to make students better understand and master different certificates in a limited time in the classroom. The characteristics of the type and keep in mind, this is the highest goal that all teachers pursue. For example, the TCM syndromes of pus are divided into wind-heat invasion, liver and gallbladder dampness, spleen dampness, and kidney loss. The local performance of the ear can be collected by ear endoscopy to conduct syndrome differentiation, and then combined with systemic conditions for differentiation, such as In addition to the external symptoms of the body, the local syndrome can be seen in the tympanic membrane red red, the normal signs disappear, or see the tympanic membrane perforation and overflowing pus; the liver and gallbladder dampness syndrome except for systemic symptoms, local can be expressed as tympanic membrane perforation.

## 5. Conclusion

Endoscopic imaging system recording will be a development direction of Otolaryngology. At present, various kinds of camera equipments dedicated to medicine are expensive, and it is difficult to promote and apply them in clinical practice. The endoscopic imaging system and digital video camera introduced in this paper are low in price and fully functional. Most of the technical indicators have reached the professional level of film and television. With the special medical accessories and computer image workstation, the medical digital image system can be widely used in otorhinolaryngology. Clinical, scientific research and teaching in the disciplines and related disciplines. It is conducive to accumulating audio-visual materials of special cases, which is convenient for tracking and comparing, which is conducive to improving the level of clinical diagnosis, and provides information for expert consultation. Recording audiovisual materials during special or exemplary surgical procedures can be stored as important medical records and can be used for post-operative discussion, summarizing experience, and even as a legal basis for medical disputes. Can improve the quality of teaching. The difficulty encountered in the clinical teaching of Otolaryngology is the lack of sufficient typical case data for teaching. It is difficult to provide students with vivid impressions by textual information only in textbooks. Audiovisual materials can take advantage of this. Since the miniature camera system can perform continuous dynamic observation recording and simultaneous recording, the audio and video materials provided are superior to ordinary photos. If it is paired with a multimedia computer and connected to the relevant information network, it can enter the first stage of modern medical information networking communication. In summary, the digital imaging system equipped with miniature cameras or digital video cameras has considerable practical value in the clinical, scientific research and teaching of Otolaryngology, especially for teaching hospitals.

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