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Analysis of the Application Effect of Sandwich Teaching Method Combined with Case Teaching Method in Clinical Teaching of Otoendoscopy

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Abstract: *Objective:* To analyze the application effect of the Sandwich teaching method combined with the case teaching method in clinical teaching of otoendoscopy. *Methods:* Fifty-five medical students who were studying in the 2019 grade of the medical school and interning in the otolaryngology department of Shaanxi Provincial People's Hospital from March 2024 to July 2024 were selected as the research subjects. They were divided into two groups using a random number table method. The traditional lecture-style teaching method was implemented in the control group ($n = 25$), while the case teaching method combined with the Sandwich teaching method was implemented in the study group ($n = 30$). The application effect was evaluated by comparing the comprehensive ability level scores, the results of the department exit test, and the satisfaction evaluation of the teaching method between the two groups. *Results:* Before enrollment, there was no statistically significant difference in comprehensive ability scores between the control group and the study group ($P > 0.05$). At the time of department exit, the comprehensive ability scores of both groups increased significantly ($P < 0.05$), and the study group had higher scores than the control group ($P < 0.05$). The study group had higher scores on the department exit test than the control group ($P < 0.05$). The teaching satisfaction scores of the students in the study group were higher than those in the control group ($P < 0.05$). *Conclusion:* Applying the Sandwich teaching method combined with the case teaching method in the clinical teaching process of otoendoscopy can enhance students' subjective initiative, greatly improve their comprehensive abilities and academic performance, effectively improve teaching quality, and enhance teaching satisfaction. It is worthy of promotion and application.

Keywords: Otoendoscopy; Clinical teaching; Sandwich teaching method; Case teaching method

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1. Introduction

In recent years, with the rapid development of otoendoscopy and surgical instruments, the advantages of otoendoscopic minimally invasive techniques have become increasingly prominent. Compared with traditional ear surgery, which introduces skin incisions near the ear, otoendoscopic minimally invasive surgery avoids open incisions and greatly reduces surgery time and wound healing time [1]. Therefore, it is of great practical significance to carry out standardized training to enable more otologists to master otoendoscopic surgery, which can reduce and avoid surgical complications. However, after reviewing the relevant literature published at home and abroad, it is found that they mainly focus on the advantages and disadvantages of otoendoscopic surgery and its surgical indications, and there is no guideline document for teaching and training of otoendoscopic surgery [2]. Although nasal endoscopy, laparoscopy, and other specialized endoscopic techniques have formed a relatively mature teaching path in resident training and further education, and some operational training has universal characteristics [3,4], there are differences in sub-specialties, and the teaching methods of otoendoscopic techniques cannot completely copy the teaching experience of other diameter techniques. Therefore, there is an urgent need to explore teaching methods suitable for otoendoscopic technology and improve teaching effects.

Currently, otoendoscopic technology training still adopts the traditional lecture-style teaching as the mainstream mode. This teaching mode is led by teachers' lectures, and students passively accept knowledge. In the teaching process, teachers impart a lot of professional knowledge and clinical experience to students [5]. In the teaching scene of otoendoscopic surgery, the operation is usually in charge of senior physicians, and students have very limited opportunities to participate in surgical operations. In the long run, students' learning enthusiasm will be frustrated, and their interest in professional knowledge will gradually decrease [6]. Therefore, traditional lecture-style teaching may not be conducive to cultivating students' clinical thinking and practical abilities, and teaching strategies need further reform and exploration. Based on extensive literature research and combined with rich teaching practice, the author attempts to combine the Sandwich teaching method with the case teaching method to objectively evaluate its application effect in clinical teaching of otoendoscopy to improve the quality of clinical teaching.

2. Subjects and methods

2.1. Subjects

Fifty-five fifth-year medical students studying from March 2024 to July 2024 were selected as the research subjects. They were divided into two groups using a random number table method. The control group consisted of 25 students, including 16 females and 9 males, with an average age of (23.31 ± 0.64) years old. The study group consisted of 30 students, including 15 females and 15 males, with an average age of (23.19 ± 0.76) years old. Upon comparison, there were no significant differences in baseline data such as gender and age between the two groups ($P > 0.05$).

2.2. Methods

The control group adopted the traditional lecture-style teaching mode. Specifically, the teaching objectives were established to enhance students' practical and diagnostic abilities in otoendoscopy, focusing on improving their abilities to accurately identify ear lesions and operate otoendoscopic equipment properly. During the teaching process, basic theories such as ear anatomy and the principles of otoendoscopic equipment were explained to help students build a theoretical knowledge system. In the practical session, key operations such as the insertion angle of the otoendoscope

and the identification of diseased tissue were analyzed in detail, encouraging students to actively ask questions. At the end of the course, a comprehensive evaluation of students' theoretical mastery, clinical case analysis, standardized patient consultation, and clinical skill operation was conducted through formative assessments such as classroom practical tests, case analysis assignments, and final exams combining theory and practice.

The study group adopted a combination of case-based teaching and the Sandwich teaching method. The teaching plan was prepared according to the Sandwich teaching method, and students were asked to review relevant literature one week before the class. The students in the study group were randomly divided into five groups (A to E), with six students in each group. The teaching process was as follows:

(1) Opening remarks: A typical case was selected as the opening, introducing and highlighting the key content of the course, and proposing five questions related to the course.

(2) Group discussion: Each group of students discussed the assigned questions extensively.

(3) Cross-learning: Students were regrouped into six new groups based on their numbers, and each student presented the discussion results from their original group, exchanged and discussed new ideas.

(4) Student reporting: Students returned to their original groups, and each group selected a representative to report the discussion results.

(5) Teacher summary: The teacher explained the questions raised in combination with the textbook, supplemented and corrected the students' discussion results, helped each student analyze the existing problems, and finally gave clear answers.

2.3. Evaluation indicators

(1) Comprehensive ability assessment: A questionnaire was used to evaluate the comprehensive ability scores of students in both groups before and after enrollment, including learning atmosphere (20 points), self-learning ability (20 points), collaboration ability (20 points), learning interest (20 points), and problem-solving ability (20 points), with a total score of 100 points.

(2) Exit test scores: The total teaching assistant evaluated the knowledge mastery of students in both groups. The assessment included theoretical basic knowledge (30 points), clinical case analysis (20 points), standardized patient consultation (20 points), and clinical skill operation (30 points), with a total score of 100 points.

(3) Teaching satisfaction: A questionnaire was used to evaluate the satisfaction of students in both groups with the teaching method, with a total score of 10 points. The higher the score, the higher the satisfaction.

2.4. Statistical methods

The data obtained from this study were analyzed using SPSS 21.0. Mean ± SD (standard deviation) was used to represent measurement data, and the *t*-test was performed. *n* (%) was used to represent count data, and the chi-square test was performed. When $P < 0.05$, it indicated significant differences between or within groups.

3. Results

3.1. Comparison of comprehensive ability scores between the two groups

Before enrollment, there was no significant difference in comprehensive ability scores between the control group and the study group ($P > 0.05$). At the time of department exit, the comprehensive ability scores of both groups increased

significantly ($P < 0.05$), and compared with the control group, the study group had higher scores. There were significant differences within and between groups ($P < 0.05$), as shown in **Table 1**.

Table 1. Comparison of comprehensive ability scores between the two groups of students (mean ± SD, scores)

Group	Learning atmosphere		Self-study ability		Collaboration ability		Learning interest		Problem-solving ability		Total score	
	Before	Upon	Before	Upon	Before	Upon	Before	Upon	Before	Upon	Before	Upon
Control group (n = 25)	11.23 ± 3.14	14.33 ± 2.22*	10.61 ± 2.29	15.61 ± 2.17*	12.10 ± 3.38	16.41 ± 1.19*	11.98 ± 2.64	14.21 ± 2.01*	10.52 ± 4.02	14.79 ± 1.62*	59.71 ± 3.34	85.73 ± 4.21*
Study group (n = 30)	10.94 ± 3.37	17.79 ± 2.06*	10.72 ± 2.48	18.79 ± 1.02*	12.42 ± 3.61	18.55 ± 1.24*	12.10 ± 2.71	17.88 ± 1.67*	10.76 ± 4.19	17.88 ± 2.13*	60.66 ± 4.41	94.79 ± 4.66*
t	0.328	5.945	0.170	6.727	0.337	6.515	0.165	7.272	0.215	6.108	0.886	7.498
P	0.744	< 0.001	0.866	< 0.001	0.738	< 0.001	0.869	< 0.001	0.830	< 0.001	0.380	< 0.001

Note: Compared with the same group before enrollment, *$P < 0.05$.

3.2. Comparison of department exit test scores between the two groups

Compared with the control group, the study group had higher scores on the department exit test, and there was a significant difference in data between the groups ($P < 0.05$), as shown in Table 2.

Table 2. Comparison of department exit test scores between the two groups (mean ± SD, scores)

Group	Basic theoretical knowledge	Clinical case analysis	Standardized patient interview	Clinical skill operation	Total score
Control group (n = 25)	21.36 ± 3.14	12.10 ± 2.27	12.88 ± 2.45	18.61 ± 4.40	78.31 ± 4.18
Study group (n = 30)	27.33 ± 2.27	16.11 ± 3.16	18.11 ± 1.57	27.67 ± 2.16	95.16 ± 2.27
t	8.168	5.303	9.577	9.944	18.944
P	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001

3.3. Comparison of teaching satisfaction between the two groups

Compared with the control group, the students in the study group had higher teaching satisfaction scores, and there was a significant difference in data between the groups ($P < 0.05$), as shown in **Table 3**.

Table 3. Comparison of teaching satisfaction between the two groups (mean ± SD, scores)

Group	Satisfaction score
Control group (n = 25)	5.12 ± 1.17
Study group (n = 30)	8.03 ± 1.50
t	7.898
P	< 0.001

4. Discussion

In the past, teachers often adopted the traditional lecture-style teaching mode in the teaching process of otoendoscopic technology, delivering a large number of viewpoints and information about clinical knowledge and surgical operations to students in a "duck-filling" manner [7]. This teacher-centered teaching method resulted in students being in a passive position during the teaching process, only passively receiving knowledge, and their subjective initiative could not be exerted. The cultivation of students' clinical innovation ability was restricted, leading to the inability to improve their clinical thinking ability and surgical operation skills, and the teaching effect was unsatisfactory [8].

With the continuous exploration of teaching methods, various methods have been applied in practical teaching. Among them, the case teaching method relies on teaching goals to find classic cases, thereby stimulating students' interest in learning. This method has significant advantages in the teaching process, and students can also learn through cases to master the methods and means of dealing with actual clinical problems [9]. However, students have become accustomed to the traditional "duck-filling" teaching method, with low active thinking and classroom participation, and a lack of active learning ability, resulting in the teaching effect of the case teaching method not meeting expectations [10]. In recent years, the Sandwich teaching method has gradually emerged, which adopts the "practice-learning-practice" model to alternate between theoretical learning and practice, which can increase students' interest in learning and mobilize their initiative and enthusiasm for learning [11].

In this study, the combination of the Sandwich teaching method and case teaching method was applied to the clinical teaching of otoendoscopy. The results showed that the research group scored significantly higher than the control group in comprehensive ability scores (learning atmosphere, self-learning ability, collaboration ability, etc.) and total scores ($P < 0.05$), indicating that the combination of the Sandwich teaching method and case teaching method effectively broke through the linear knowledge transfer mode of traditional teaching. Through the three-stage cycle of "theoretical input - case discussion - operational feedback", students are transformed from passive recipients to active participants. Simultaneously, the simulation of clinical situations in case teaching encourages students to integrate theory and skills in dynamic decision-making, thus bridging the gap between "knowledge" and "action" in traditional teaching [12]. The results of the department exit test directly reflect the impact of teaching methods on the mastery of knowledge and skills. The research group was superior to the control group in terms of theoretical basic knowledge, clinical case analysis, standardized patient inquiry, and clinical skill operation ($P < 0.05$). This result indicates that the combination of the Sandwich teaching method and case teaching allows students to consolidate their knowledge through actual cases after theoretical learning and practice operations in simulated clinical scenarios, achieving a tight integration of theory and practice [13]. Furthermore, the student satisfaction score of the research group was much higher than that of the control group ($P < 0.05$), indicating that this teaching method is highly recognized by students. The reason is that in the teaching process, the case teaching method concretizes abstract knowledge, allowing students to

experience the practicality of knowledge in real case discussions and enhancing their learning motivation. At the same time, the Sandwich teaching method provides students with more opportunities for expression and communication, increases their classroom participation, and improves their satisfaction with the teaching method [14].

5. Conclusion

In summary, the application of the Sandwich teaching method combined with the case teaching method in the clinical teaching process of otoendoscopy can enhance students' subjective initiative, greatly improve their comprehensive abilities and academic performance, effectively enhance teaching quality, and boost teaching satisfaction. It is worthy of promotion and application. However, this study has limitations such as a limited sample size and a short observation period. In subsequent research, it is necessary to further expand the sample size, actively carry out multi-center clinical teaching practices, comprehensively verify the practical value and advantages of this teaching model, and enable the deep promotion and application of the Sandwich teaching method combined with the case teaching method in more clinical teaching activities of otology.

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Disclosure statement

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