Application Effect of the Multidisciplinary Team (MDT) Teaching Model in Otolaryngology Anesthesia for Standardized Residency Training

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Abstract: Objective: To explore the application effect of the multidisciplinary team (MDT) teaching model in otolaryngology anesthesia for standardized residency training (referred to as "residency training"), and to provide practical evidence for optimizing the residency training system in otolaryngology anesthesia. Methods: A total of 65 residency physicians in otolaryngology anesthesia at our hospital from March 2024 to March 2025 were selected and divided into an observation group (32 physicians) and a control group (33 physicians) using the random number table method. The control group adopted the traditional single-disciplinary teaching model, while the observation group adopted a multidisciplinary collaborative teaching model involving the departments of anesthesiology, otolaryngology, imaging, and nursing. The theoretical assessment scores, clinical operation skill scores, case comprehensive analysis ability scores, teaching satisfaction, and the incidence of anesthesia-related complications in patients were compared between the two groups. Results: The theoretical assessment scores, clinical operation skill scores, and case comprehensive analysis ability scores in the observation group were significantly higher than those in the control group (all $P < 0.001$). The teaching satisfaction in the observation group was significantly higher than that in the control group ($P = 0.035 < 0.05$). Among the 102 patients under the care of residency physicians in the observation group, the incidence of anesthesia-related complications was 3.13%. Among the 106 patients under the care of residency physicians in the control group, the incidence of anesthesia-related complications was 15.15%. The incidence of complications in the observation group was significantly lower than that in the control group ($\chi2 = 9.250$, $P = 0.002$). Conclusion: The MDT teaching model in otolaryngology anesthesia can effectively enhance the theoretical knowledge, clinical operational skills, and comprehensive case analysis abilities of resident physicians in training. It also improves teaching satisfaction and reduces the incidence of anesthesia-related complications in patients, making it worthy of promotion and application in resident training programs.

Keywords: Otolaryngology anesthesia; Multidisciplinary collaboration; Standardized residency training; Teaching effectiveness

1. Introduction

The anatomical structures in otolaryngology are complex, involving critical areas such as the airway and skull base [1]. Anesthesia procedures in this field carry high risks and pose significant challenges, placing extremely high demands on the comprehensive abilities of resident physicians in training. Traditional residency training often focuses primarily on single-disciplinary instruction within the anesthesia department [2], leaving resident physicians with only anesthesia operation skills and lacking a systematic understanding of the diagnostic and treatment characteristics of otolaryngological diseases, imaging diagnostic criteria, and nursing coordination during the peri-anesthesia period. This results in difficulties in quickly responding to complex cases in clinical practice, affecting anesthesia quality and patient safety. The multidisciplinary team (MDT) teaching model, by integrating resources from different disciplines and breaking down disciplinary barriers, enables resident physicians to understand the relationship between diseases and anesthesia from multiple dimensions. This model has already achieved favorable results in medical education in fields such as oncology and critical care medicine [3,4]. However, there have been few studies on the application of the MDT teaching model in otolaryngology anesthesia residency training. This study, involving 65 resident physicians in otolaryngology anesthesia training, compares the application effects of the MDT teaching model with those of the traditional single-discipline teaching model, aiming to provide references for improving the otolaryngology anesthesia residency training program.

2. Materials and methods

2.1. General information

A total of 65 physicians who participated in the anesthesia residency training program for otolaryngology in the Department of Anesthesiology at this hospital from March 2024 to March 2025 were selected. All of them held a bachelor's degree or higher in medicine, had no prior work experience in otolaryngology anesthesia, and underwent a 12-month residency training cycle. Using a random number table method, they were divided into an observation group (32 physicians) and a control group (33 physicians). The observation group consisted of 18 males and 14 females, aged between 23 and 28 years, with an average age of 25.12 ± 1.45 years; in terms of educational background, there were 20 with a bachelor's degree and 12 with a master's degree. The control group consisted of 19 males and 14 females, aged between 22 and 27 years, with an average age of 24.89 ± 1.38 years; in terms of educational background, there were 21 with a bachelor's degree and 12 with a master's degree. There were no statistically significant differences in general information, such as gender, age, and educational background, between the two groups of resident physicians ($P > 0.05$), indicating comparability.

2.2. Teaching methods

The control group received single-disciplinary teaching in the Department of Anesthesiology, with a total of 480 hours (40 hours per month): (1) Theoretical teaching (120 hours), where senior anesthesiologists delivered lectures on otolaryngology anesthesia theory, including airway management, using PowerPoint presentations, with quarterly Q&A sessions; (2) Practical teaching (300 hours), where resident physicians learned anesthesia procedures alongside their instructors, receiving one-on-one verbal guidance from their teachers; (3) Assessment and evaluation (60 hours), where theoretical and practical examinations were conducted every six months, with scores solely given by anesthesiologists.

The observation group adopted the MDT teaching model, which was led by the Department of Anesthesiology and involved the collaboration of the Departments of Otolaryngology, Imaging, and Nursing

to form an MDT teaching team, with a total of 480 teaching hours (40 hours per month). The specific implementation was as follows: (1) Team division of labor: personnel with associate senior titles or above and over 5 years of clinical teaching experience were included—5 anesthesiologists (responsible for anesthesia theory and operations), 3 otolaryngologists (responsible for disease diagnosis and treatment knowledge), 2 imaging specialists (responsible for imaging diagnosis), and 2 nurses from the nursing department (responsible for nursing coordination during the peri-anesthesia period). (2) Theoretical teaching (120 hours): Multidisciplinary joint instruction was provided, with each discipline teaching its corresponding knowledge separately. Multidisciplinary case discussions were held once every two months. (3) Practical teaching (300 hours): Multidisciplinary collaborative instruction was carried out, where resident physicians in standardized training learned anesthesia operations while participating in multidisciplinary practice, with multidisciplinary simulation exercises conducted once a month. (4) Assessment and evaluation (60 hours): Multidisciplinary joint assessments were conducted, covering multidisciplinary theory, operations, and comprehensive case analysis.

2.3. Observation indicators

(1) Professional competence indicators: Assessment conducted after the completion of teaching, including: (a) Theoretical assessment: A closed-book examination with a full score of 100, covering multidisciplinary knowledge (observation group) or solely anesthesiology knowledge (control group); (b) Clinical operational skills: A full score of 100, with grading dimensions including operational compliance (40 points), proficiency in movements (30 points), and emergency response capability (30 points); (c) Comprehensive case analysis ability: Three complex anesthesia cases were selected, and trainees were required to write anesthesia plans, with a full score of 100. The assessment evaluates the rationality of the plan (40 points), the integration of multidisciplinary knowledge (30 points), and risk anticipation ability (30 points).

(2) Teaching satisfaction: A questionnaire survey was employed, setting three dimensions: "practicality of teaching content," "effectiveness of teaching methods," and "effectiveness of ability enhancement," with a total of 10 items. Responses are categorized as very satisfied, generally satisfied, and dissatisfied. Satisfaction rate = (number of very satisfied + generally satisfied cases) / total number of cases × 100%.

(3) Anesthesia safety indicators: The incidence of anesthesia-related complications (airway injury, anesthesia drug allergy, postoperative sore throat) in patients under the responsibility of trainees during their residency training period was statistically analyzed to calculate the complication rate.

2.4. Statistical methods

Data analysis was performed using SPSS 26.0 statistical software. Measurement data were expressed as mean ± standard deviation (SD), and comparisons between groups were made using the independent samples t-test. Count data were expressed as rates (%), and comparisons between groups were made using the χ^2 test. A P-value < 0.05 indicated that the difference was statistically significant.

3. Results

3.1. Comparison of assessment scores of resident physicians in training between the two groups

The theoretical assessment scores, clinical operation skill scores, and comprehensive case analysis ability scores

of the observation group were significantly higher than those of the control group (all $P < 0.001$), as shown in **Table 1**.

Table 1. Comparison of assessment scores of resident physicians in training between the two groups (mean ± SD, points)

Group	Theoretical assessment score	Clinical skills score	Clinical reasoning score
Observation group ($n = 32$)	89.56 ± 4.12	91.34 ± 3.76	90.12 ± 3.95
Control group ($n = 33$)	81.23 ± 5.08	83.15 ± 4.82	82.46 ± 4.73
t-value	7.248	7.622	7.076
P-value	< 0.001	< 0.001	< 0.001

3.2. Comparison of teaching satisfaction among resident physicians in training between the two groups

The teaching satisfaction of the observation group was significantly higher than that of the control group ($P = 0.035 < 0.05$), as shown in **Table 2**.

Table 2. Comparison of teaching satisfaction among resident physicians in training between the two groups [n (%)]

Group	Very satisfied	Satisfied	Dissatisfied	Overall satisfaction
Observation group ($n = 32$)	19 (59.38)	12 (37.50)	1 (3.12)	31 (96.88)
Control group ($n = 33$)	10 (30.30)	15 (45.45)	8 (24.24)	25 (75.76)
χ^2-value				4.432
P-value				0.035

3.3. Comparison of the incidence of anesthesia-related complications in patients under the care of resident physicians in training between the two groups

Among the 102 patients under the care of resident physicians in training in the observation group, the incidence of anesthesia-related complications was 3.13%; among the 106 patients under the care of resident physicians in training in the control group, the incidence of anesthesia-related complications was 15.15%. The incidence of complications in the observation group was significantly lower than that in the control group ($\chi^2 = 9.250$, $P = 0.002$), as shown in **Table 3**.

Table 3. Comparison of the incidence of anesthesia-related complications in patients under the care of resident physicians in training between the two groups [n (%)]

Group	Number of cases	Airway injury	Anesthetic drug allergy	Postoperative sore throat	Other complications	Total complications
Observation group	102	1 (0.98)	0 (0.00)	2 (1.96)	0 (0.00)	3 (2.94)
Control group	106	4 (3.77)	2 (1.89)	8 (7.55)	2 (1.89)	16 (15.09)
χ^2-value						9.250
P-value						0.002

4. Discussion

Under the traditional single-discipline teaching model, resident physicians in training are only exposed to knowledge in the field of anesthesiology and lack understanding of the characteristics of otolaryngological diseases, the value of imaging diagnosis, and key points of nursing cooperation. This makes it difficult for them to comprehensively assess anesthesia risks in clinical practice and develop targeted anesthesia plans. The MDT teaching model, on the other hand, enables resident physicians in training to understand otolaryngological anesthesia from a "single perspective" to a "multi-dimensional perspective" by integrating multidisciplinary resources [5]. The results of this study showed that the scores of theoretical assessment, clinical operational skills, and comprehensive case analysis ability in the observation group were significantly higher than those in the control group, indicating that the MDT teaching model can effectively enhance the comprehensive abilities of resident physicians in training.

From the perspective of theoretical learning, multidisciplinary joint teaching breaks down disciplinary boundaries, enabling resident physicians in standardized training to not only master anesthesia knowledge but also understand the pathophysiological mechanisms of otolaryngological diseases, methods for interpreting imaging data, and key points of nursing coordination, thereby constructing a comprehensive knowledge system. In clinical practice, multidisciplinary collaborative teaching allows resident physicians in standardized training to participate in preoperative ward rounds, imaging interpretation, and nursing coordination while performing anesthesia procedures, deeply integrating theoretical knowledge with clinical practice and enhancing the standardization and rationality of clinical operations [6]. Additionally, multidisciplinary joint simulation exercises and case discussions enable resident physicians in standardized training to learn to collaborate with multidisciplinary teams in handling emergencies in simulated scenarios, thereby enhancing their comprehensive case analysis and emergency response capabilities [7].

Teaching satisfaction surveys indicate that satisfaction in the observation group is significantly higher than that in the control group, closely related to the advantages of the MDT teaching model. The traditional teaching model primarily relies on "teacher-led lectures," leaving resident physicians in standardized training in a passive learning state with a monotonous curriculum that struggles to stimulate learning interest [8]. In contrast, the MDT teaching model employs diverse teaching methods such as multidisciplinary joint teaching, collaborative teaching, and simulation exercises, actively involving resident physicians in standardized training in the teaching process. For instance, in multidisciplinary case discussions, resident physicians in standardized training can interact with teachers from different disciplines, ask questions, and receive multidimensional answers; in simulation exercises, they deepen their understanding of knowledge through practical operations. This teaching model not only enriches the learning content but also enhances the learning enthusiasm and initiative of resident physicians in standardized training, resulting in higher satisfaction [9].

The incidence of anesthesia-related complications in patients is an important indicator for measuring the quality and safety of anesthesia [10]. In this study, the incidence of complications in the observation group was significantly lower than that in the control group, indicating that the MDT teaching model can effectively improve the clinical practice quality of resident trainees and ensure patient safety. Under the MDT teaching model, by learning knowledge of otolaryngological diseases and methods for interpreting imaging, resident trainees can more accurately assess patients' anatomical structures and disease characteristics, anticipate anesthesia risks in advance, and develop targeted anesthesia plans. Meanwhile, under the guidance of nursing instructors, resident trainees have mastered the details of nursing cooperation during the peri-anesthesia period, enabling them to better collaborate with the nursing team, promptly identify and address potential issues,

thereby reducing the incidence of complications.

5. Conclusion

In conclusion, the MDT teaching model for otolaryngological anesthesia can effectively enhance resident trainees' theoretical knowledge, clinical operational skills, and comprehensive case analysis abilities, improve teaching satisfaction, and reduce the incidence of anesthesia-related complications in patients, making it worthy of promotion and application in resident training.

Disclosure statement

The authors declare no conflict of interest.

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