





ORIGINAL RESEARCH

Left-handedness in otolaryngology, who is right?

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Abstract

Objectives: This study aimed to ascertain the prevalence of left-handedness (LH) among otolaryngology—head and neck surgery (ORLHN) practitioners, investigate dexterity's impact on LH trainees, and identify common patterns in their training to improve the training experience.

Methods: A web-based survey was distributed anonymously via email to members of the Saudi Otorhinolaryngology Society. The survey targeted ORLHN attending consultants, board-certified registrars, and current residents. It consisted of three sections: the first focused on the experience of attending consultants in training LH individuals, the second investigated common maneuvers employed by rhinologists, and the third explored the experiences and impacts reported by LH trainees.

Results: The study included 174 participants, and found a 13.2% LH prevalence among them. Rhinologists showed disparities, with 50% advising trainees to stand on the left side of the bed and use their left hand for the scope, whereas the other half asked otherwise. Additionally, 94.4% of the participants had not encountered any courses specifically tailored for LH trainees. Among LH trainees, 57% and 41% reported difficulties in learning and performing side-specific procedures such as functional endoscopic sinus surgery and endoscopic septoplasty, respectively, often attempting to switch to their nondominant hand, and feeling disadvantaged due to their laterality.

Conclusions: Left-handedness presents challenges for both LH trainees and their trainers in surgical specialties, particularly in ORLHN, in which specific positioning and instruments are crucial to gain access to the desired surgical field. Despite these challenges, there is insufficient support for LH individuals. We recommend encouraging LH trainees to openly disclose and discuss their left-handedness, provide them with mentors, establish standardized operating room setups and techniques, supply appropriate instruments, and demonstrate flexibility in accommodating their needs.

Level of evidence: Level 5.

KEYWORDS

ambidexterity, laterality, left-handed, otolaryngology, resident training

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1 | INTRODUCTION

The issue of handedness within the medical profession has been an area of interest and concern.^{1,2} Numerous studies have explored the prevalence of left-handedness (LH) among medical professionals and its potential impact on their performance.²⁻⁴ Whereas the relationship between handedness and surgical performance remains a topic of debate, it is clear that LH individuals face unique challenges when operating in a predominantly right-handed (RH) world.^{5,6} Surgical instruments and equipment are often designed for RH users, creating potential ergonomic challenges for LH surgeons.⁷

LH is considered a challenge in the surgical field for both LH trainees and RH attending consultants.⁷⁻⁹ During residency, the anxiety rate among LH surgeons is reported to be about 50%. This might be due to a clear lack of specialized mentorship, as many studies have reported that LH surgeons lack support and proper training in motor skills during residency programs.^{8,10-13} Many studies have been conducted in other surgical fields, including general surgery, cardiac surgery, neurosurgery, dentistry, pediatric surgery, and orthopedics,¹⁴⁻¹⁹ but there is a paucity of data from the field of otolaryngology—head and neck surgery (ORLHN), despite its very long learning curve due to the need for skillfulness and dexterity.²⁰⁻²²

In the context of otolaryngologists who are tasked with performing intricate surgical procedures in these sensitive areas of the human body, handedness—the preference for using the left or right hand—takes on profound significance, as it can influence a surgeon's performance, patient outcomes, and the overall quality of care provided. This study aims to achieve two primary objectives. First, it seeks to estimate the prevalence of LH among practitioners in the field of ORLHN. Second, it aims to investigate the impact of dexterity on LH trainees and identify common patterns in their training with the ultimate goal of improving the training experience for LH individuals.

2 | MATERIALS AND METHODS

The study was approved by the institutional review board of King Saud University's Sub-Committee of Humanities Studies, number 23-765. An anonymous web-based survey was sent through an email to all members of the Saudi Otorhinolaryngology Society, with the mention that submitting the survey would be considered as providing informed consent. The email was sent three times in July 2023, and responses were received from July 18 until August 30. We included ORLHN attending consultants, board-certified registrars, and current residents. We excluded non-ORLHN specialties, nonsurgically exposed specialties (audiology, speech, and phoniatrics), junior residents who had not been exposed to ORLHN procedures (first post-graduate year), interns, and students.

2.1 | Survey design

Three sections were developed for this study. The first section was provided to the attending consultants, asking them about their training

methods and strategies for LH trainees. The second section was exclusively shown to attending consultant rhinologists to investigate the common maneuvers used in training LH trainees. The third section was distributed to all LH ORLHN surgeons and was adapted with permission from Anderson et al.⁷ and then modified to fit the ORLHN context. Prior to distribution, all three sections were validated through a focus group consisting of ORLHN attending consultants, rhinologists, and LH individuals (Supplemental Material 1 in Data S1).

2.2 | Statistical analysis

The data were collected using Google Forms and transferred to an Excel spreadsheet for analysis using the Statistical Package for Social Sciences (SPSS), version 23. Categorical data were presented as numbers and percentages. The chi-square test was used to compare categorical variables, with a significance level of $p \leq .05$ applied to all associations.

3 | RESULTS

A total of 182 responses were collected, resulting in a response rate of 35%. Of these, 174 were included in the analysis. The demographic

TABLE 1 Demographic data for the included responses.

Age (mean ± standard deviation)	34.3 ± 6.9
Gender	
Male	114 (65.5%)
Female	60 (34.5%)
Practice setting	
Governmental hospital	96 (55.2%)
University hospital	42 (24.2%)
Military hospital	31 (17.8%)
Private sector	5 (3%)
Level	
Attending consultant	55 (31.6%)
Registrars	38 (21.8%)
Fellow	21 (12.1%)
Senior resident	32 (18.4%)
Junior resident	28 (16.1%)
Lateral dominance in writing	
Right handed	151 (86.8%)
Left handed	23 (13.2%)
Lateral dominance in sport	
Right handed	138 (79.3%)
Left handed	21 (12.1%)
Ambidextrous	15 (8.6%)
Lateral dominance in surgery	
Right handed	130 (74.7%)
Left handed	14 (8.1%)
Ambidextrous	30 (17.2%)

TABLE 2 Attending consultants' experience in teaching LH trainees.

Section 1. Rating the obstacles in training LH surgeons				
		More difficult to teach LH	No difference	Easier to teach LH
The difficulty of teaching the surgical procedure for a LH compared to RH trainee.	All	15 (27.3)	33 (60)	7 (12.7)
	Rhinology	7 (38.9)	11 (61.1)	0 (0)
	Otology	1 (11.1)	6 (66.7)	2 (22.2)
	Head & neck	3 (33.3)	6 (66.7)	0 (0)
	Facial plastic	1 (14.2)	3 (42.9)	3 (42.9)
	Pediatrics	0 (0)	5 (83.3)	1 (16.7)
	Laryngology	2 (66.7)	1 (33.3)	0 (0)
	General ORL	1 (33.3)	1 (33.3)	1 (33.3)
		LH trainees have more technical ability	No difference	LH trainees have less technical ability
Rating the technical ability of LH to learn/perform operating procedures in comparison to RH trainee.	All	8 (14.5)	43 (78.2)	4 (7.3)
	Rhinology	1 (5.5)	14 (77.8)	3 (16.7)
	Otology	4 (44.4)	5 (55.6)	0 (0)
	Head & neck	1 (11.1)	8 (88.9)	0 (0)
	Facial plastic	0 (0)	7 (100)	0 (0)
	Pediatrics	2 (33.3)	4 (66.7)	0 (0)
	Laryngology	0 (0)	2 (66.7)	1 (33.3)
	General ORL	0 (0)	3 (100)	0 (0)
		More comfortable teaching LH	No difference	Less comfortable teaching LH
Rating the technical ability of LH to learn/perform operating procedures in comparison to RH trainee.	All	4 (7.3)	44 (80)	7 (12.7)
	Rhinology	1 (5.6)	13 (72.2)	4 (22.2)
	Otology	1 (11.1)	8 (88.9)	0 (0)
	Head & neck	0 (0)	7 (77.8)	2 (22.2)
	Facial plastic	1 (14.3)	6 (85.7)	0 (0)
	Pediatrics	0 (0)	6 (100)	0 (0)
	Laryngology	0	3 (100)	0 (0)
	General ORL	1 (33.3)	1 (33.3)	1 (33.3)
Section 2. Training LH trainees by rhinologists				
Standing position of the LH surgeon during ENS.	At right side of the patient (classical)	At the left side of the patient		
	9	9		
Nondominant hand (to hold the endonasal scope) during ENS.	By the nondominant hand (right)	By the dominant hand (left)		
	9	9		
During endoscopic septoplasty, preferred side for the Killian incision.	Left side (Classical)	Right side	Depends on the deviation side	
	4	2	12	
Previous experience with a rhinology course where specific materials and/or tools were provided for LH participants.	Yes	No		
	17	1		

Abbreviations: ENS, endoscopic sinus surgery; LH, left-handed; ORL, otolaryngology; RH, right-handed.

TABLE 3 The experience of LH surgeons in otolaryngology head and neck surgery training (%).

Section 1. Questions with binary answers						
	All (n = 23)		Juniors (n = 4)		Seniors ^a (n = 19)	
	Yes	No	Yes	No	Yes	No
Availability of LH surgical instruments	2 (8.7)	21 (91.3)	0 (0)	4 (100)	2 (10.5)	17 (89.5)
Difficulty in learning side-specific procedures	11 (47.8)	12 (52.2)	1 (25)	3 (75)	10 (52.6)	9 (47.4)
Considerations for changing handedness	11 (47.8)	12 (52.2)	2 (50)	2 (50)	9 (47.4)	10 (52.6)
Feeling pressured to change handedness	11 (47.8)	12 (52.2)	2 (50)	2 (50)	9 (47.4)	10 (52.6)
Feeling disadvantaged due to laterality	10 (43.5)	13 (56.5)	2 (50)	2 (50)	8 (42.1)	11 (57.9)
Having a negative impact on grades and feedback in clerkship due to laterality	6 (26.1)	17 (73.9)	0 (0)	4 (100)	6 (31.6)	13 (68.4)
Considerations for switching subspecialties	4 (17.4)	19 (82.6)	0 (0)	4 (100)	4 (21.1)	15 (78.9)
Considerations for switching to nonsurgical specialty	0 (0)	23 (100)	0 (0)	4 (100)	0 (0)	19 (100)
Having a mentor provided during training	3 (13)	20 (87)	1 (25)	3 (75)	2 (10.5)	17 (89.5)
Approaching a LH surgeon for advice	8 (34.8)	15 (65.2)	1 (25)	3 (75)	7 (36.8)	12 (63.2)
Notifying the senior trainer about laterality	11 (47.8)	12 (52.2)	3 (75)	1 (25)	8 (42.1)	11 (57.9)
Section 2. Questions with several answers						
		More difficult to learn from LH surgeon			No difference	Easier to learn from LH surgeon
		All	Juniors	Seniors ^a		
Rating the difficulty of learning operating procedures from LH surgeons compared to RH surgeons	All	2 (8.7)	13 (56.5)	8 (34.8)		
	Juniors	0 (0)	4 (100)	0 (0)		
	Seniors ^a	2 (10.5)	9 (47.4)	8 (42.1)		
		I have more technical ability (%)			No difference (%)	I have less technical ability (%)
		All	Juniors	Seniors ^a		
Rating the technical ability to learn and perform operating procedures compared to RH trainees at the same experience level	All	7 (30.5)	15 (65.2)	1 (4.3)		
	Juniors	2 (50)	2 (50)	0 (0)		
	Seniors ^a	5 (26.3)	13 (68.4)	1 (5.3)		
		Always	Often	Sometimes	Rarely	Never
		All	Juniors	Seniors ^a		
Feeling the faculty annoyance about being LH	All	1 (4.4)	1 (4.4)	4 (17.4)	7 (30.4)	10 (43.4)
	Juniors	0 (0)	0 (0)	1 (25)	1 (25)	2 (50)
	Seniors ^a	1 (5.3)	1 (5.3)	3 (15.8)	6 (31.5)	8 (42.1)
		Intern	Junior resident	Senior resident	Fellowship	I do not know
		All				
The level of training at which LH felt comfortable controlling their surgical technique ^b	All	2 (10.5)	2 (10.5)	9 (47.4)	5 (26.3)	1 (5.3)

Abbreviations: LH, left-handed; RH, right-handed.

^aSeniors refer to senior residents, registrars, and attending consultants.

^bAnswers for junior residents were removed from this question.

characteristics of the participants are summarized in Table 1. Regarding lateral dominance in writing, the majority of participants were RH (86.8%), whereas 13.2% were LH. In terms of lateral dominance in sport, the majority of participants reported RH (79.3%), with 12.1% reporting LH and 8.6% reporting ambidexterity. In the context of surgical procedures, 74.7% of participants were RH, 8.1% were LH, and 17.2% reported ambidexterity.

Table 2 displays the experience of attending consultants in teaching LH trainees. It reveals that teaching LH trainees is perceived as more challenging in the fields of rhinology (38.9%) and laryngology

(66.7%). Conversely, in the field of facial plastic, almost half of the attending consultants find LH trainees easier to train compared to RH trainees (42.9%). During endoscopic nasal surgery, the rhinology consultants were evenly split (50%) in terms of teaching trends for their LH trainees about the standing position and the hand used to hold the endonasal scope. The majority of attending consultants (94.4%) had not attended rhinology courses in which specific materials and tools were provided for LH trainees.

From the LH trainees' perspective, as shown in Table 3, only a minority (8.7%) reported having LH-specific instruments available to

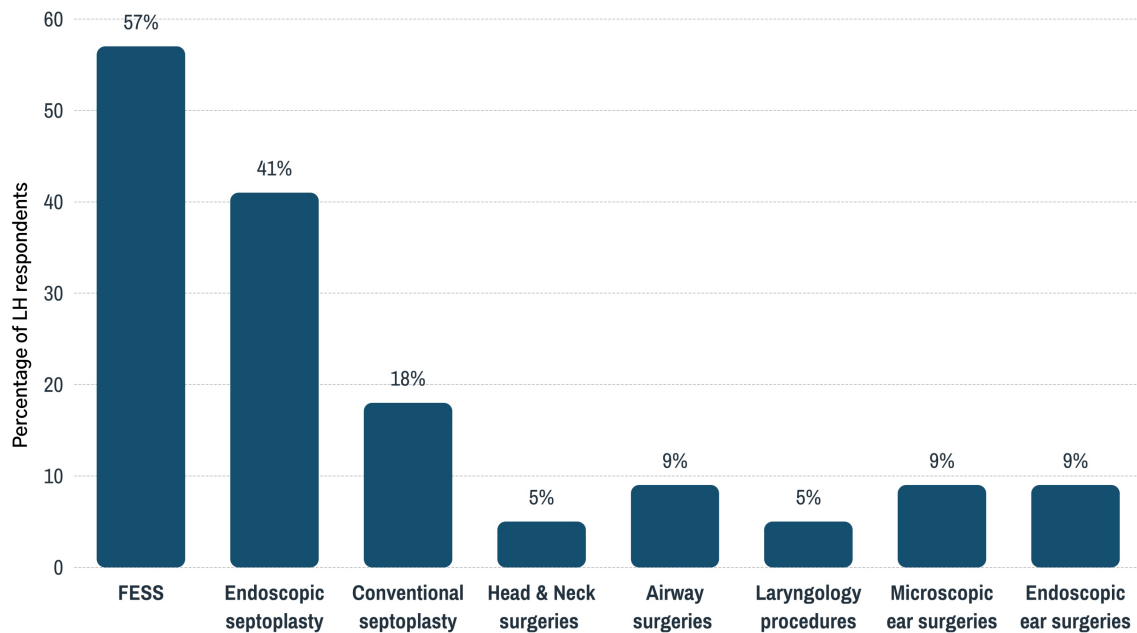


FIGURE 1 Clustered bar chart showing the percentage of common procedures as chosen by LH surgeons as challenging to learn and perform. LH, left-handed.

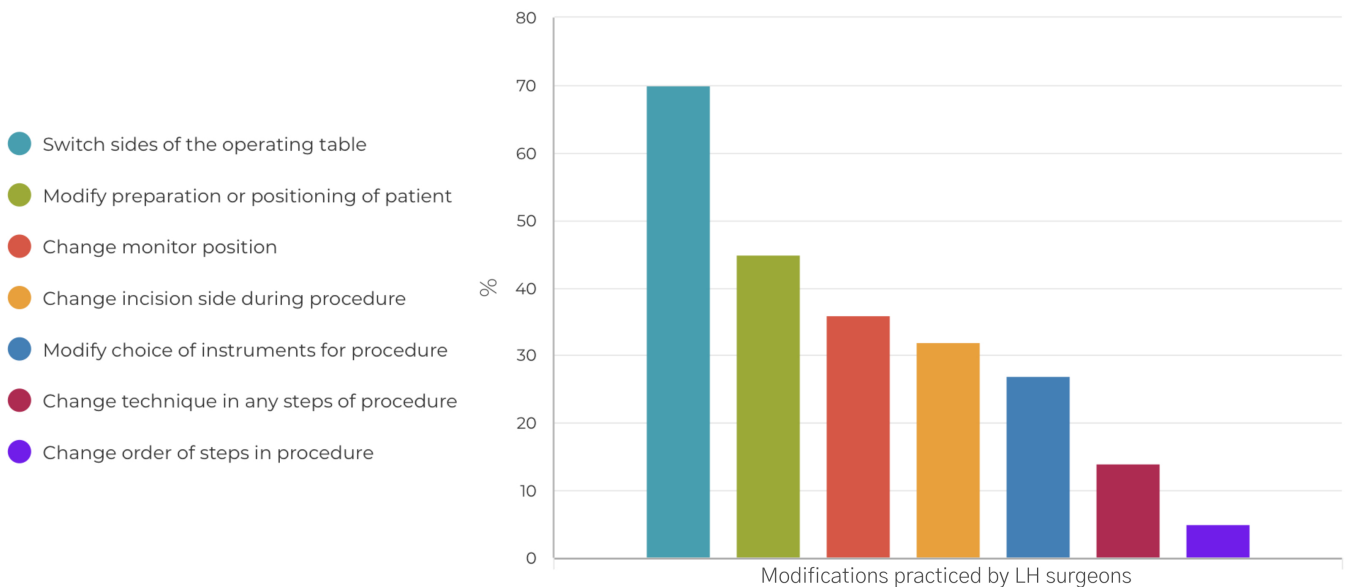


FIGURE 2 A clustered column chart illustrating the modifications practiced by LH surgeons during ORLHN procedures, with corresponding percentages indicating the extent of adaptation based on laterality. LH, left-handed; ORLHN, otolaryngology–head and neck surgery.

them. Additionally, around half of the LH respondents (43.5%) expressed feeling disadvantaged due to their laterality during training. Approximately 73.7% felt comfortable controlling surgical techniques at the senior and fellowship levels.

Figure 1 displays the most challenging procedures encountered by LH surgeons during their training, whereas Figure 2 illustrates the common modification methods adopted by LH surgeons. Finally, Table 4 showcases the ORLHN subspecialties most frequently chosen

by both LH and RH ORLHN attending consultants as well as the areas of interest among both LH and RH trainees.

The responses to open-ended questions and comments revealed several noteworthy observations. Attempts to use the nondominant hand in tissue manipulation were reported to result in increased tissue damage, as noted by a laryngologist. Additionally, nine attending physicians highlighted the challenges associated with teaching endoscopic nasal surgeries to LH trainees compared to their RH counterparts. In

	RH (%)	LH (%)	p-value ^a
General otolaryngology	26 (17.2)	4 (17.4)	.942
Rhinology	52 (34.4)	11 (47.8)	.183
Otology	23 (15.2)	3 (13)	.96
Head and neck surgery	30 (19.9)	2 (8.7)	.235
Pediatric otolaryngology	27 (17.8)	6 (26.1)	.28
Facial plastic	39 (25.8)	6 (26.1)	.841
Laryngology	23 (15.2)	3 (13)	.896
Sleep surgery	7 (4.6)	1 (4.4)	.81
Nonsurgical (audiology or speech/phoniatrics)	2 (1.3)	0	.694

TABLE 4 Choice and interest in subspecialties for LH compared to RH.

Abbreviations: LH, left-handed; RH, right-handed.

^aChi-square test was used and a p-value less than .5 was considered significant.

the field of otology, as observed by attending consultants, LH trainees reported better exposure and easier access to the right ear, whereas RH individuals found it easier to access the left side, particularly when opening the facial recess. Discrepancies in teaching approaches were also reported, with one trainee indicating that some consultants advocated using the dominant hand, whereas others encouraged the use of the nondominant hand, leading to limitations in training consistency. A senior resident observed that her mentor avoided teaching certain procedures to LH trainees due to a lack of familiarity with tailoring teaching methods to their needs. Moreover, the fixed position of the monitor in the operating room, tailored for RH surgeons, necessitated excessive neck rotation during surgery, leading to neck and back pain. Finally, four left-handed surgeons reported difficulties in handling scissors, whereas two mentioned challenges in using laryngoscopes and esophagoscopes.

4 | DISCUSSION

This study aimed to address an important gap in the literature regarding handedness in the field of ORLHN. Understanding the prevalence and impact of LH training among ORLHN practitioners is crucial as it has been a topic of interest and concern in the broader medical profession.^{1,2,14} LH is present in about 10% of the world's population.²³ Almost the same percentage is present among medical personnel.^{9,10} Although the exact percentage of LH is unknown, it is believed to be less common among surgeons.²⁴ However, the percentage varies among surgical specialties, as neurosurgery has reported the highest percentage, followed by orthopedic surgery and general surgery, with 17%, 15%, and 10%–13%, respectively.^{16,19,23,25} In our study, we found a relatively close LH prevalence of 13.7%, which is higher than in a recent study conducted among rhinologists and otolaryngology trainees, in which only 7% were identified as LH.²⁰

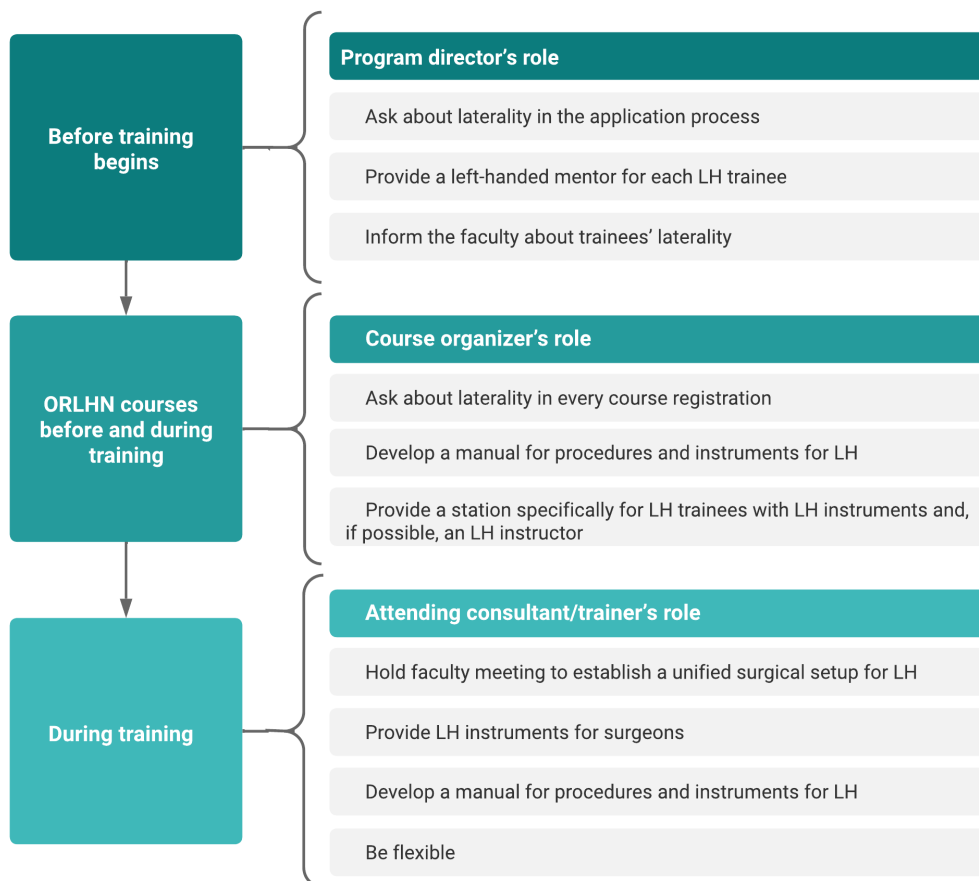
Situation-specific anxiety was observed to be significantly higher in LH surgeons.¹¹ In the RH world, one in four left-handed surgeons were anxious about pursuing a surgical profession due to their handedness.¹⁰ However, in our study, we did not observe any LH surgeons

expressing a desire to change careers due to dexterity-related issues. Additionally, we found no significant association between LH and specific subspecialty interests or avoidance, despite the notable challenges observed during endonasal endoscopic procedures in the field of rhinology.

Difficulty in rhinology is expected and is clearly demonstrated by the fact that 57% and 41% of LH surgeons reported challenges when performing functional endoscopic sinus surgery and endoscopic septoplasty, respectively. This is lower than the findings of a study conducted by Lamb et al. in 2023, where nearly 71.5% of LH respondents experienced difficulty with FESS.²⁰ In contrast to conventional surgery, in which LH surgeons are required to reverse the usual motion to perform the task,⁸ in endoscopic endonasal surgery, LH surgeons face the challenge of either using their nondominant hand as the main surgical hand, which can result in difficulties with grip strength and fine motor control,²⁰ or assuming an unconventional position opposite the standard surgeon's position. These findings underscore the importance of developing specialized training methods, instruments, and ergonomic solutions tailored to the needs of LH surgeons in rhinology. This issue is less prominent in other subspecialties of ORLHN, even in laterality-based procedures such as tonsillectomy or endoscopic laryngeal surgery, because hand choice can be influenced by the laterality of the lesion.²⁶ Our findings support this, as other procedures seen in other subspecialties such as head and neck surgery, laryngology, airway surgery, and otology were almost similarly challenging to learn from the LH perspective compared to RH trainees.

One approach to the issue of LH was observed in cardiothoracic surgery, pediatric surgery, and ophthalmology, for which specific tips and manuals were provided regarding the procedures and how to handle instruments specifically for LH surgeons.^{15,27,28} Unfortunately, in our literature search, we were unable to find a similar approach for ORLHN training. Furthermore, the lack of mentorship, specialized instruments, and specific courses adds to the negative impact on LH surgeons, as identified in our results. The discrepancy in teaching left-handed trainees in rhinology is another drawback, as trainees who rotate between different attending consultants will encounter differences in major maneuvers, such as standing position and scope-

FIGURE 3 Proposed flowchart for enhancing LH experience at various stages. LH, left-handed.



holding hand, leading to increased ambiguity and a slower learning curve. However, LH surgeons have demonstrated a better sense of adaptability compared to RH surgeons,^{19,29} which explains why they reported being able to handle and adapt to this issue when they became senior residents. Therefore, we propose a scheme to address these difficulties and suggest a viable solution (Figure 3). We believe that implementing these steps can help overcome the obstacles identified in our research. The suggested solutions consider different training settings and roles, aiming to create a more inclusive and supportive learning environment for LH trainees, ultimately enhancing their overall training experience.

Whereas this study provides valuable insights into the prevalence of LH in ORLHN and explores the challenges faced by LH trainees, it is important to acknowledge certain limitations. The sample size was relatively small and may not be representative of the entire population of ORLHN practitioners. The reliance on self-reported data introduces the potential for recall bias and subjective interpretations. The voluntary nature of the survey may have resulted in response bias. Additionally, the study's cross-sectional design limits the ability to capture the chronological changes in LH difficulties over the years of training, as these challenges may change over time, particularly between a trainee's junior and senior years, depending on the ambidexterity of the surgeon and the quality of the training they receive. Future research with larger, diverse samples and a longitudinal design is

warranted to address these limitations and to provide a more comprehensive understanding of the challenges faced by LH trainees in ORLHN.

5 | CONCLUSION

LH presents unique challenges for both LH trainees and their trainers in surgical specialties, especially in the context of ORLHN, in which precise positioning and optimal instrument access are paramount to achieve successful surgical outcomes. Unfortunately, there is currently a lack of support for LH individuals in this field. To address these challenges, encouraging LH trainees to openly disclose and discuss their left-handedness without hesitation is crucial. Furthermore, providing LH trainees with dedicated mentors who have experience and expertise in working with LH surgeons can greatly enhance their learning experience. Standardizing operating room setups and techniques to accommodate LH trainees is another essential step. Moreover, the provision of appropriate instruments designed specifically for left-handed surgeons is crucial. Finally, it is essential for trainers and educators to exhibit flexibility and adaptability in their approach to LH trainees.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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