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ORIGINAL-RESEARCH-ARTICLE

Perioperative Antibiotic Use in Esophagoscopy With or Without Therapeutic Intervention: Survey Study

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Abstract

Background: There is a little data evaluating antibiotic use esophagoscopy with or without therapeutic intervention.The goal of this study was to determine antibiotic use rate and factors that influence antibiotic use during esophagoscopy.

Methods: An onlinebased` survey was distributed to the laryngologists across U.S.Outcomes included the antibiotic use in general,fellowship training,practice location,surgeon experience,and patient factors influencing antibiotic use.

Results: There were 2` respondents (24.13% response rate).100% were in academic institutions.88.1% of Respondents were fellowship-trained laryngo logists.` Most surgeons (90.5%)don't give perioperative antibiotics during diagnostic esophagoscopy while 21.4% , 19%,9.5% of the respondents give antibiotics during Esophagoscopy with Balloon Dilatation , Bougies Dilatation,UES otulinum` Toxin Injection respectively.n` general,o` statistically significant association was found between the routine of prescribing preoperative antibiotics and being fellowshiptrained` in laryngology or not by using Fishers` Exact Test while a statistically significant association was found between the fellowship training and the decision made based on patients' comorbidities ($P<0.05$).Using onferroni` correction,A significant difference was observed between having a fellowship in laryngology or not,and prescribing perioperative antibiotics(sometimes)in Esophagoscopy with alloon` Dilatation($P <0.005$.Furthermore,the` decision to prescribe perioperative antibiotics based on the patient's comorbidities was significantly associated with the years after the fellowship completed was completed,$P<0.05$.

Conclusion: This study shows that most of the laryngologists do not prescribe antibiotic during esophagoscopy in general but there was significant variation in prescribing practices based on patient comorbidities, fellowship training in laryngology, and years of practice after residency or fellowship.

Keywords: EsophagoscopyAntibiotic` prophylaxis-bacteremia- complication

Level of Evidence: Level 4—According to the xford` Center for Evidence-Based Medicine 2011 level of evidence guidelines.

1|INTRODUCTION

Bacteremia and postoperative infection complication can occur after esophagoscopy with or without therapeutic intervention. Fortunately, complications resulting from dissemination of endogenous bacteria are very rare. Furthermore, for most diagnostic and therapeutic esophagoscopy there is scant evidence that antibiotic prophylaxis can reduce the incidence of postoperative infection complications. There is a little data supporting antibiotic prophylaxis during esophagoscopy with or without therapeutic intervention. The risk of bacteremia during upper and lower gastrointestinal endoscopy has been well established in many series by gastroenterologists but there is no clear data has been published by laryngologists or otolaryngologists. Given the lack of high-level evidence supporting the use of perioperative antibiotics in esophagoscopy with or without intervention, we sought to survey the laryngologists in united states to determine current practice patterns pertaining to perioperative antibiotic use and to identify factors that influence the use of antibiotics.

2 | MATERIALS AND METHODS

A 19-item online-based survey was designed using Google form. This study was electronically distributed to most of the laryngologists across the states. Two email notifications were sent over a period of 8 weeks. The survey remained open online for a period of 12 weeks after the final notification and participation was voluntary. Responses were recorded anonymously, and no identifying information was collected.

Demographic characteristics of the respondents were collected, including type of clinical practice, completion of a fellowship in laryngology, duration of practice in years, In-operating room versus In-office setting, Flexible versus Rigid endoscopy, and practice volume. The antibiotic use in Esophagoscopy with or without different therapeutic interventions (Balloon or Bougies Dilatation, Botulinum Toxin injection, were assessed. Frequency of antibiotic use in each of these categories was stratified as “Always (100% of the time),” “Often (>70% of the time),” “Sometimes (30-70% of the time),” or “Infrequent (less than 30%).” Respondents were given the opportunity to select 1 or more reasons as to why they prescribed perioperative antibiotics. The impact of patient comorbidities on antibiotic use was also assessed. All the survey responses were included in the analysis. Data was entered and analyzed using SPSS version 20. Descriptive analysis was used to summarize the variables under study using frequencies and percentages (for categorical variables). Inferential analysis was used to detect any association between the variables, using Chi-square and Fisher exact tests. A p-value < 0.05 was considered statistically significant. Furthermore, the observed significant association (after conducting the chi-square test) between the variables was followed by pairwise comparisons using the Bonferroni post hoc test to determine where the significance allies (to distinguish which group is different from the other). Performing multiple statistical tests may lead to type 1 error, thus the Bonferroni correction method was used to reduce the probability of committing this error. Bonferroni-adjusted p-value was calculated using the following formula:

Bonferroni α = (Original α)/(Number of Tests) . No IRB approval was needed for this survey study based on New York University IRB committee.

3 | RESULTS

Of the 174 laryngologists who received the survey, 42 respondents completed the survey, for a response rate of 24.13%. In terms of the surgeons’ characteristics (Table 1), the majority (88.1%) are fellowship-trained in laryngology as well as All the participants were in full-time academic positions. There was a wide range of experience among participants, fourteen participants (33.3%) have completed 11-20 years post residency/ fellowship training, and seven participants (16.7%) completed more than 20 years. All the participants

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reported that they perform Esophagoscopy (with or without interventional procedures). In term of the practice volume (Table 1), the majority of participants (64.1%) perform between 11-50 Esophagoscopies (with or without interventional procedures) per year. Regarding the routine of prescribing preoperative antibiotics, a significant proportion reported that they do not prescribe antibiotics in either type of Esophagoscopy procedures (Table 1). Furthermore, over half of the participants stated that they never prescribe preoperative antibiotics in any of the procedures. Surgeons were also asked about the reasons of prescribing antibiotic, and if there are any factors may influence prescribing antibiotics in their practice. The most selected reasons for prescribing preoperative antibiotics were to reduce potential bacterial burden (27.3%), followed by that was the way they learned it (13.6%). Twenty-six responders (69.1%) stated that they do not prescribe antibiotics based on patients' comorbidities, and neither the type of Esophagoscopy performed or the procedure setting may influence the decision on perioperative antibiotic prescription as per 92.9% of the participants. There was no statistically significant association between the routine of prescribing preoperative antibiotics and being fellowship-trained in laryngology or not (P>0.05) (Table 2). In terms of the basis of decision-making in prescribing perioperative antibiotics, a statistically significant association was found between the fellowship training and the decision made based on patients' comorbidities (P<0.05) (Table 2). Around 70% of those with fellowship training do not prescribe perioperative antibiotics based on comorbidities. A significant majority of the surgeons who undergo fellowship training do not prescribe perioperative antibiotics depending on either the Esophagoscopy type performed or the procedure site, on the other hand, a small proportion dose; this difference was not statistically significant P>0.05. A significant difference was observed between having a fellowship in laryngology or not, and prescribing perioperative antibiotics sometimes in Esophagoscopy with Balloon Dilatation (P < 0.005) (Table 3). we found a statistically significant difference between the number of years post residency/fellowship and the decision to prescribe perioperative antibiotics based on patients' comorbidities (P<0.00625), 40% of the surgeons who completed more than 20 years in residency/fellowship stated that they do prescribe perioperative antibiotics when it came to patients' comorbidities, in comparison, only 6.7% don't (Table 4 and 5). There was no significant association between the Esophagoscopies performed per year and the routines, frequencies and decisions' basis of prescribing perioperative antibiotics (Table 6).

Table 1: *Demographic Characteristics of the participants.*

Variables	N	%
Surgeon characteristics	**42**	**100**
Fellowship-trained in Laryngology		
• Yes	37	88.1%
• No	4	9.5%
Work setting		
• Full-time academic position	42	100%
• Private practice with academic affiliation	0	0%
• Independent or group private practice	0	0%
Residency/Fellowship training years completed		
• 0-5	8	19%
• 6-10	13	31%
• 11 – 20 years	14	33.3%
• More than 20 years	7	16.7%
Perform Esophagoscopy (with or without interventional procedures)		
• Yes	42	100%
• No	0	0%
Esophagoscopies (with or without therapeutic interventions) performed per year		
• 0 – 10	6	14.3%
• 11 – 25	14	33.3%
• 26 – 50	13	31%
• More than 50	8	19%
Routinely prescribe perioperative antibiotics:		
In Non-Interventional Esophagoscopy		
• Yes	4	9.5%
• No	38	90.5%
In Esophagoscopy with Balloon Dilatation		
• Yes	9	21.4%
• No	33	78.6%
In Esophagoscopy with Bougies Dilatation		
• Yes	8	19%
• No	34	81%
In Esophagoscopy with UES Botulinum Toxin Injection		
• Yes	4	9.5%
• No	38	90.5%
Frequency of prescribing perioperative antibiotics		
In Non-Interventional Esophagoscopy		
• Always	3	7.1%
• Infrequent (less than 29%)	10	23.8%
• Sometimes (30% to 69% of the time)	2	4.8%
• Often (>70% of the time)	1	2.4%
• Never	26	61.9%
In Esophagoscopy with Balloon Dilatation		
• Always	5	11.9%
• Infrequent (less than 29%)	9	21.4%
• Sometimes (30% to 69% of the time)	2	4.8%
• Often (>70% of the time)	3	7.1%
• Never	23	54.8%
In Esophagoscopy with Bougies Dilatation		
• Always	4	9.5%
• Infrequent (less than 29%)	12	28.6%
• Sometimes (30% to 69% of the time)	0	0%
• Often (>70% of the time)	1	2.4%
• Never	25	59.5%
Reasons for prescribing perioperative antibiotic(s) (n= 36)		
• Presence of active infection	4	9.1%
• To reduce potential bacterial burden	12	27.3%
• That is how I was taught	6	13.6%
• High rate of infection in your area	0	0%
• Other	22	50%
Decision to prescribe perioperative antibiotics based upon:		
The patient's comorbidities		
• Yes	15	35.7%
• No	26	61.9%
The type of Esophagoscopy that you are performing		
• Yes	1	2.4%
• No	39	92.9%
The procedure setting (In-office versus in Operating Room)		
• Yes	2	4.8%
• No	39	92.9%

Table 2: *The association of being a fellowship-trained in laryngology or not and the routines, and decisions' basis of prescribing perioperative antibiotics.*

Variables		Fellowship-trained in Laryngology		Statistical test P-value
		Yes n= 37	No n= 4	
Routinely prescribe perioperative antibiotics:				Fisher's Exact Test P-value
a) In Non-Interventional Esophagoscopy	Yes	4 (10.8%)	0 (0%)	P= 1
	No	33 (89.2%)	4 (100%)	
b) In Esophagoscopy with Balloon Dilatation	Yes	8 (21.6%)	1 (25%)	P= 1
	No	29 (78.4%)	3 (75%)	
c) In Esophagoscopy with Bougies Dilatation	Yes	8 (21.6%)	0 (0%)	P= 0.569
	No	29 (78.4%)	4 (100%)	
d) In Esophagoscopy with UES Botulinum Toxin Injection	Yes	4 (10.8%)	0 (0%)	P= 1
	No	33 (89.2%)	4 (100%)	
Decision to prescribe perioperative antibiotics based upon:				Fisher's Exact Test P-value
a) The patient's comorbidities	Yes	11 (30.6%)	4 (100%)	P= 0.015*
	No	25 (69.4%)	0 (0%)	
b) The type of Esophagoscopy that you are performing	Yes	1 (2.9%)	0 (0%)	P= 1
	No	34 (97.1%)	4 (100%)	
c) The procedure setting (In-office versus in Operating Room)	Yes	2 (5.6%)	0 (0%)	P= 1
	No	34 (94.4%)	4 (100%)	

Table 3: *Post-Hoc comparison results (using Bonferroni correction).*

Are you fellowship-trained in laryngology*How frequently do you give perioperative antibiotics in Esophagoscopy with balloon dilatation	Adjusted z score (Adjusted Residuals)	Chi-square value	P-value	Bonferroni-corrected p-value	Significance
Yes*Never	2.27	5.15	.0232	0.005	NS
No*Never	-2.27	5.15	.0232	0.005	NS
Yes*Infrequent	-1.43	2.04	.1527	0.005	NS
No*Infrequent	1.43	2.04	.1527	0.005	NS
Yes*Sometimes	-4.41	19.45	.0000*	0.005	Significant
No*Sometimes	4.41	19.45	.0000*	0.005	Significant
Yes*Often	.59	.35	.5552	0.005	NS
No*Often	-.59	.35	.5552	0.005	NS
Yes*Always	.78	.61	.4354	0.005	NS
No*Always	-.78	.61	.4354	0.005	NS
Are you fellowship-trained in laryngology*How frequently do you prescribe perioperative antibiotics in Esophagoscopy with Bougies dilatation					
Yes*Never	2.33	5.43	.0198	0.005	NS
No*Never	-2.33	5.43	.0198	0.005	NS
Yes*Infrequent	-1.58	2.50	.1141	0.005	NS
No*Infrequent	1.58	2.50	.1141	0.005	NS
Yes*Sometimes	-4.35	18.92	.0000*	0.005	Significant
No*Sometimes	4.35	18.92	.0000*	0.005	Significant
Yes*Often	.70	.49	.4839	0.005	NS
No*Often	-.70	.49	.4839	0.005	NS
Yes*Always	.70	.49	.4839	0.005	NS
No*Always	-.70	.49	.4839	0.005	NS

Table 4: *The association of the number of residency/ fellowship years completed and the routines, and decisions' basis of prescribing perioperative antibiotics.*

Variables		Number of years completed in residency/fellowship training				Chi-square test P-value
		0-5	6-10	11-20	20+	
Routinely prescribe perioperative antibiotics:						
a) In Non-Interventional Esophagoscopy	Yes	2 (50%)	1 (25%)	0 (0%)	1 (25%)	X^2= 4.627 P= 0.201
	No	6 (15.8%)	12 (31.6%)	14 (36.8%)	6 (15.8%)	
b) In Esophagoscopy with Balloon Dilatation	Yes	3 (33.3%)	3 (33.3%)	1 (11.1%)	2 (22.2%)	X^2= 3.434 P= 0.329
	No	5 (15.2%)	10 (30.3%)	13 (39.4%)	5 (15.2%)	
c) In Esophagoscopy with Bougies Dilatation	Yes	2 (25%)	3 (37.5%)	1 (12.5%)	2 (25%)	X^2= 2.277 P= 0.517
	No	6 (17.6%)	10 (29.4%)	13 (38.2%)	5 (14.7%)	
d) In Esophagoscopy with UES Botulinum Toxin Injection	Yes	2 (50%)	1 (25%)	0 (0%)	1 (25%)	X^2= 4.627 P= 0.201
	No	6 (15.8%)	12 (31.6%)	14 (36.8%)	6 (15.8%)	
Decision to prescribe perioperative antibiotics based upon:						
a) The patient's comorbidities	Yes	1 (6.7%)	4 (26.7%)	4 (26.7%)	6 (40%)	X^2= 9.984 P= 0.019*
	No	7 (26.9%)	9 (34.6%)	9 (34.6%)	1 (3.8%)	
b) The type of Esophagoscopy that you are performing	Yes	0 (0%)	0 (0%)	0 (0%)	1 (100%)	X^2= 3.611 P= 0.307
	No	7 (17.9%)	13 (33.3%)	13 (33.3%)	6 (15.4%)	
c) The procedure setting (In-office versus in Operating Room)	Yes	1 (50%)	1 (50%)	0 (0%)	0 (0%)	X^2= 2.903 P= 0.407
	No	7 (17.9%)	12 (30.8%)	13 (33.3%)	7 (17.9%)	

Table 5: *Post-Hoc comparison results (using Bonferroni correction).*

How many years out of residency and fellowship training have you completed* Decision to prescribe perioperative antibiotics based upon patient's comorbidities					
0-5*No	1.58	2.50	.11411	0.00625	NS
6-10*No	.53	.28	.59611	0.00625	NS
11-20*No	.53	.28	.59611	0.00625	NS
20+*No	-2.96	8.76	.00308*	0.00625	Significa
0-5*Yes	-1.58	2.50	.11411	0.00625	NS

Table 6: *The association between the Esophagoscopies performed per year and the routines, and decisions' basis of prescribing perioperative antibiotics.*

Variables		Esophagoscopies (with or without therapeutic interventions) performed per year				P-value
		0 – 10	11 – 25	26 – 50	+50	
Routinely prescribe perioperative antibiotics:						
a) In Non - Interventional Esophagoscopy	Yes	0 (0%) (0%)	1 (25%) (7.1%)	2 (50%) (15.4%)	1 (25%) (12.5%)	X^2= 1.819 P= 0.611
	No	6 (16.2%) (100%)	13 (35.1%) (92.9%)	11 (29.7%) (84.6%)	7 (18.9%) (87.5%)	
b) In Esophagoscopy with Balloon Dilatation	Yes	1 (11.1%) (16.7%)	2 (22.2%) (14.3%)	3 (33.3%) (23.1%)	3 (33.3%) (37.5%)	X^2= 1.635 P= 0.651
	No	5 (15.6%) (83.3%)	12 (37.5%) (85.7%)	10 (31.2%) (76.9%)	5 (15.6%) (62.5%)	
c) In Esophagoscopy with Bougies Dilatation	Yes	0 (0%) (0%)	3 (37.5%) (21.4%)	3 (37.5%) (23.1%)	2 (25%) (25%)	X^2= 2.881 P= 0.410
	No	6 (18.2%) (100%)	11 (33.3%) (78.6%)	10 (30.3%) (76.9%)	6 (18.2%) (75%)	
d) In Esophagoscopy with UES Botulinum Toxin Injection	Yes	0 (0%) (0%)	1 (25%) (7.1%)	2 (50%) (15.4%)	1 (25%) (12.5%)	X^2= 1.819 P= 0.611
	No	6 (16.2%) (100%)	13 (35.1%) (92.9%)	11 (29.7%) (84.6%)	7 (18.9%) (87.5%)	
Decision to prescribe perioperative antibiotics based upon:						
a) The patient 's comorbidities	Yes	1 (7.1%) (16.7%)	6 (42.9%) (42.9%)	3 (21.4%) (25%)	4 (28.6%) (50%)	X^2= 2.681 P= 0.443
	No	5 (19.2%) (83.3%)	8 (30.8%) (57.1%)	9 (34.6%) (75%)	4 (15.4%) (50%)	

4 | DISCUSSION

Esophagoscopy, a medical procedure used in the diagnosis and treatment of various conditions in the fields of otolaryngology and gastroenterology, is one of the commonly performed endoscopic examinations. However, this procedure carries a certain level of risk as it may lead to bacterial translocation of microbial flora into bloodstream.

The translocation of the bacteria can occur due to various reasons. On such reason is the mucosal trauma caused by the procedure itself. The use of endoscopes and other accessories can cause micro-abrasions and tears in the mucosal lining of the gastrointestinal tract, allowing bacteria to enter the bloodstream. Additionally, local infections may occur where a typically sterile space or tissue is breached during the procedure.

Furthermore, bacterial translocation can occur due to the injection of the contaminated materials, such as contrast agents or therapeutic substances. According to research findings, patients undergoing esophageal dilation or sclerotherapy of varices procedures are at a higher risk of developing bacteremia , a serious bloodstream infection that can lead to life-threatening complications[1]. The incidence of bacteremia following esophageal bougienage has also been studied extensively , with results showing that it ranges from 12% to 22% based on three prospective trials[2],[3],[4]. Additionally, it has been noted that bacteremia may occur more frequently in cases involving malignant strictures compared to benign [3]. Furthermore , it has been observed that the use of multiple dilators during the procedure could also lead to a higher likelihood of bacteremia compared to single dilation [3].

The bacteremia infection risk associated with these procedure underscores the importance of taking proper preventive measures to minimize the spread of infections. Streptococcus viridans , a common bacteria found in the mouth, was identified in approximately 79% of the cases studied[2], indicating that the infection may have originated from the oral cavity. These findings suggest that dental hygiene, such as regular brushing and flossing, may play a critical role in preventing bacteremia during esophageal procedures. Moreover, the Impact of bacteremia on the global health system is immense , as it increases the economic burden on healthcare facilities and negatively affects patient's quality of life . It is imperative for healthcare providers to implement appropriate infection control practice such as the use of sterile equipment , to minimize the risk of infection during procedures.

Given the potential risk associated with the use of antibiotic prophylaxis, including the emergence of antibiotic- resistant strain of bacteria and adverse drug reactions, it is critical that the use of antibiotic prophylaxis during esophagoscopy procedures be carefully considered, with a focus on evidence -based and judicious use of antibiotics to minimized the risk of adverse event.

In the past, the use of antibiotic prophylaxis was a common practice during many gastrointestinal endoscopic procedures in order to prevent infective endocarditis (IE). However, in 2007, the American Heart association (AHA) released new guidelines that stated the administration of prophylactic antibiotics solely to prevent IE was no longer recommended for patients undergoing GI endoscopy, except for those with certain conditions such as history of IE, prosthetic heart valves or certain congenital heart defects [5]. The new guidelines from AHA were based on a review of existing evidence, which found that the risk of developing IE from GI endoscopy was low and that the use of prophylactic antibiotic was not necessary for most patients. The updated guidelines from AHA were intended to help physicians make more informed decisions about the use of antibiotic prophylaxis during GI endoscopy, based on the individual patient's risk factors and medical history.

In our study, we conducted an indirect assessment of the level of awareness among laryngologist across different states regarding the role of prophylaxis antibiotics in esophagoscopy procedures. These procedures included diagnostic , balloon dilatation, bougies dilatation , and UES botulinum toxin injection. Our study revealed that a significant proportion of participants do not typically prescribe perioperative antibiotics in their routine procedures (90.5%, 78.6%, 81%, and 90% respectively).These results imply that laryngologists adhere to and are knowledgeable about the most recent recommendations for these procedures.

In contrast to our results, Feuerstein and colleagues[6] conducted a survey of internal medicine residency programs and attending physicians in internal medicine subspecialities in three medical centers to assess their knowledge of the current recommendations for antibiotic use before GI endoscopy. The study found that there was poor knowledge among participants regarding these recommendations, particularly in patients with relevant comorbidities.

Our study hypothesized that laryngologist who have received fellowship training in laryngology and have extensive experience in esophagoscopy procedure might have different prescribing practices for perioperative antibiotic. However, our study findings revealed that there was no significant association between routine perioperative antibiotics prescription and being fellowship-trained in laryngology or not.

In contrast , Feuerstein et al study [6] focused on evaluating the knowledge of different attending physicians in different internal medicine subspecialties regarding antibiotic prophylaxis before GI endoscopy, they found that gastroenterologists answered the survey questions more correctly compared to other , indicating that specialty-specific training and experience might impact awareness and adherence to guidelines. The results of our study suggest that the decision to prescribe antibiotics based on patient comorbidities is significantly associated with two factors: fellowship training in laryngology and years of practice after residency or fellowship. Specifically, our study found that the majority of fellowship-trained laryngologists did not prescribe antibiotics based on patient comorbidities. The majority of our study participants had their laryngology training at a period when there was a greater knowledge of revised recommendations intended to reduce needless antibiotic resistance and adverse events, which, in our opinion, may help to explain this strong link.

These doctors may thus be more inclined to follow current recommendations and refrain from giving antibiotics until absolutely essential. Interestingly, our study also found that physicians with more than 20 years of practice were more likely to prescribe perioperative antibiotics when it came to patients' comorbidities, despite the absence of clear guidelines recommending this practice. We speculate that this may be due to the fact that these physicians have encountered more complex patients or unexpected complications over the course of their careers, which may have influenced their decision-making regarding antibiotic prophylaxis.

While our study sheds light on the adherence of laryngologists to the updated ASGE guidelines in antibiotic prophylaxis during GI endoscopy, there are several limitations that should be considered. Firstly, our study was conducted as a survey with a response rate of 24.13%, which may limit the generalizability of our findings to the larger population of laryngologists. Secondly, our study did not incorporate actual clinical practice and relied solely on self-reported practices and opinions of the respondents. Moreover, our study only addressed the use of antibiotic prophylaxis in specific esophagoscopy procedures, and did not explore the role of perioperative antibiotic use in newer esophagoscopy procedures such as cricopharyngeal myotomy or endoscopic Zenker's diverticulum using staples or laser. Therefore, future studies should focus on evaluating the effectiveness and safety of antibiotic prophylaxis in these procedures. Finally, while our study suggests that most laryngologists are following the ASGE guidelines for antibiotic prophylaxis during GI endoscopy.

5 | CONCLUSION

Our study highlights the variability in the prescribing practices of antibiotics during esophagoscopy among laryngologists. While most laryngologists do not prescribe antibiotics during esophagoscopy in general, there was significant variation in prescribing practices based on patient comorbidities, fellowship training in laryngology, and years of practice after residency or fellowship. Further research might be needed to fully understand the role of antibiotics in newer esophagoscopy procedures and to establish evidence-based guidelines for their use.

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