

# From pioneers to modern medicine: tracing the evolution of our understanding of the relationship between Eustachian tube dysfunction, alternobaric vertigo, and laryngopharyngeal reflux

## Abstract

Decades of research have been devoted to understanding the complicated connections between the ears, nose, throat, and stomach. Pioneers in the discipline of otolaryngology/ear, nose, and throat (ENT), James Yearsley (1805–1869) and Peter Allen (1826–1844), produced theories and concepts that allowed us to determine the relationship between these items. The current study has contributed to clarifying the complex relationship between Eustachian tube dysfunction (ETD), alternobaric vertigo (ABV), gastroesophageal reflux disease (GERD), laryngopharyngeal reflux (LPR), and nasopharyngeal reflux (NPR). These interrelationships are required for guiding otolaryngology research and improving patient care. This article investigates the historical and contemporary links between ETD, ABV, and LPR. James Yearsley developed the concept of “stomach deafness” in 1843, suggesting a relationship between stomach issues and hearing loss. Peter Allen thought that ETD might be related to vertigo, especially “alternobaric vertigo,” which happens when the air pressure changes in the labyrinth and affects the fluid in it. Recent investigations have shown that NPR or LPR can produce ETD and ABV by irritating and inflaming the Eustachian tube. For otolaryngology research to progress and patient care to improve, it is critical to understand both the historical and modern perspectives on these complex interactions.

**Keywords:** Eustachian tube dysfunction, alternobaric vertigo, gastroesophageal reflux disease, laryngopharyngeal reflux, nasopharyngeal reflux

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**Abbreviations:** ENT, ear, nose, and throat; ETD, Eustachian tube dysfunction; ABV, alternobaric vertigo; GERD, gastroesophageal reflux; LPR, laryngopharyngeal reflux; NPR, nasopharyngeal reflux

## Introduction

The connections between the stomach, throat, and ears are complex and not yet fully understood. Early leaders in otolaryngology/ear, nose, and throat (ENT) research, like James Yearsley (1805–1869) and Peter Allen (1826–1844), had new ideas about what ear diseases are, what causes them, and how to treat them. James Yearsley introduced new ideas about ear diseases, their causes, and treatments. Yearsley’s 1847 book “Deafness Practically Illustrated” explained how diseases of the mucous membrane lining the throat, nose, and ear can cause deafness. He also introduced the term “stomach deafness,” which refers to deafness caused by the stomach.<sup>1</sup> Yearsley also discussed gastroesophageal reflux disease (GERD), laryngopharyngeal reflux disease (LPR), and nasopharyngeal reflux disease (NPR) and how they can cause Eustachian tube problems. His work established the foundation for the current investigation into the link between these conditions and Eustachian tube dysfunction (ETD). Understanding historical and current perspectives on these complex relationships is critical for guiding otolaryngology research and improving patient care. He described Eustachian tube catheterization as an effective “diagnosis and treatment method.”<sup>1</sup> ETD occurs when the tube fails to open or close properly, causing fluid and pressure to accumulate in the middle ear. Possible symptoms include hearing loss, ear pain, tinnitus, and vertigo.<sup>1–11</sup> Allen also noticed that vertigo caused by ETD could be treated locally with an air douche and catheterization of the Eustachian tube as follows: “These are the uses of the catheter. It is, in essence, a device that allows access to the Eustachian tube and middle

ear cavity. This lets us put air back in and treat parts that would be hard to reach without a hole in the tympanic membrane, which exposes the drum to the outside.” In addition, Allen claimed that pressure on the fluid in the labyrinth or inside the ear is what causes vertigo. Allen’s lectures emphasized the significance of comprehending how vertigo manifests and its relationship to ETD.<sup>2</sup> Unfortunately, despite his insightful hypothesis, many otologists today are ignorant of this connection and often do only vestibular function tests for their vertigo patients. Yearsley and Allen had no idea that new ways to travel and have fun, such as flying and scuba diving, would change the field of otology in unexpected ways. Lundgren coined the term “alternobaric vertigo” in 1965 to describe the type of vertigo that can happen when the pressure in the middle ear changes because of changes in altitude or water pressure.<sup>11</sup> This shows how important it is to know how the ear, nose, and throat work together in order to correctly diagnose and treat problems like ETD, LPR, and alternobaric vertigo (ABV).

Recent research has helped to confirm and build on the ideas of these early pioneers, shedding light on the complicated relationship between ETD, LPR, and ABV.<sup>3–13</sup> LPR is a type of GERD that affects the upper airway and can cause symptoms such as hoarseness, coughing, and throat clearing.<sup>13</sup> ABV is a condition in which dizziness is caused by a change in pressure in one ear compared to the other.<sup>3,4,8,9,11</sup>

This review looks at the complicated relationship between ETD, ABV, and LPR from both a historical and current perspective. We start by talking about the study’s history and significance. The empirical literature in the field as well as the ideas of early pioneers such as Yearsley and Allen are then discussed. Then, using specific research questions, we discuss the gaps in our knowledge from previous research and explain the purpose of our current study.

Overall, our aim is to contribute to a better understanding of the complex relationships between ETD, ABV, and LPR and to develop more effective treatments for patients suffering from these conditions.

## Discussion

The purpose of this research was to examine the complicated relationship between ETD, ABV, and LPR from both a historical and modern perspective.<sup>1-11</sup> The findings of this study demonstrated that ETD can contribute to LPR and that LPR can contribute to ETD.<sup>6</sup> They also demonstrated how these conditions can result in other related conditions, such as alternobaric vertigo.<sup>3,4,7-9,11</sup>

The use of both ancient and new material to demonstrate the evolution of these complex interactions over time is a strength of this study. In addition, the study used a systematic approach to review the literature to ensure that it covered the entire topic. One limitation of this study is that it does not focus on specific treatments for these conditions, such as the Eustachian tube catheterization that Peter Allen discusses in his lectures.

Yearsley explained the concepts of GERD, LPR, and NPR and the causal relationship between LPR or NPR and Eustachian tube dysfunction. Peter Allen also explained that ETD can cause alternobaric vertigo and laryngopharyngeal reflux.<sup>2</sup> This idea that LPR and ETD have a reciprocal causal relationship that works both ways, like Yearsley and Peter's relationship between a teacher and an assistant, has been the subject of a lot of research in recent years.<sup>6</sup> The results of this study are consistent with those of other studies, indicating that understanding how ETD and LPR both cause and are caused by each other is critical to developing effective treatments for people suffering from these conditions.<sup>6</sup> Eustachian tube catheterization is a useful diagnostic and treatment method that can give people with ETD more treatment options.<sup>1-4,9,14</sup> Furthermore, Merica observed in 1942 that ETD cases with a slow onset are more likely to be overlooked because gastrointestinal symptoms predominate, implying that ETD can also cause GERD and LPR.<sup>4</sup> These findings emphasize the complex and reciprocal nature of the relationship between ETD, LPR, and related conditions.<sup>6</sup>

Understanding this relationship is critical for developing more effective treatments for people suffering from these diseases. While some treatments, such as dietary changes and medication, have been shown to be effective, much about the underlying mechanisms of ETD, LPR, and ABV remains unknown. More research is needed to fill these knowledge gaps and develop new treatments for ETD and LPR.

The use of catheterization of the Eustachian tube as a diagnostic and treatment method is an intriguing area of research.<sup>3,4,9,14</sup> This approach may provide more treatment options for people with ETD, as well as help relieve LPR and ABV symptoms. However, more research is required to fully understand the efficacy of this method and to identify any potential risks or side effects.

To summarize, there is a complex and bidirectional relationship between ETD, LPR, and ABV. Each condition has the ability to both cause and be caused by the others. When a patient has both ETD and LPR, it can be difficult to determine which condition is causing their symptoms. However, correcting and balancing the pressure in the middle ear can break the cycle of these conditions and help relieve symptoms. To comprehend how these conditions function and to develop more effective treatments for those who suffer from them, additional research is necessary.

## Conclusion

In conclusion, researchers have been looking into the complicated link between ETD, LPR, and ABV for many years. James Yearsley and Peter Allen, two of the first people to study otolaryngology and ENT, helped us learn a lot about these conditions. We have been able to confirm and expand on their ideas through modern research, which has helped us learn more about how ETD and LPR cause each other and how they are linked to ABV.

Even though we know more about these conditions now, there is still a lot to learn about how they work and the best way to treat them. To make effective treatments for people with ETD, LPR, and ABV, more research is needed. By recognizing and appreciating the contributions of early pioneers in otolaryngology/ENT research, we can inform and improve our current understanding of complex relationships in medicine and ultimately provide better outcomes for our patients.

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## Conflicts of interests

Authors declare no conflict of interests.

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