



Original Article

Cost-effectiveness analysis of endoscopic tympanoplasty versus microscopic tympanoplasty for chronic otitis media in Taiwan

Chih-Chieh Tseng^{a,b,c,*}, Ming-Tang Lai^a, Chia-Che Wu^{a,c}, Sheng-Po Yuan^a, Yi-Fang Ding^a

^a Department of Otolaryngology, Wan Fang Medical Center, Taipei Medical University, Taipei, Taiwan, ROC

^b Department of Otolaryngology, Pojen General Hospital, Taipei, Taiwan, ROC

^c Department of Otolaryngology, School of Medicine, College of Medicine, Taipei Medical University, Taipei, Taiwan, ROC

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Abstract

Background: Health care systems and physicians need to conform to budgets and streamline resources to provide cost-effective quality care. Although endoscopic tympanoplasty (ET) has been performed for decades, no studies on the cost-effectiveness of ET and microscopic tympanoplasty (MT) for treating chronic otitis media have been published. The present study aimed to compare the cost-effectiveness of ET and MT for treating chronic otitis media.

Methods: This study was performed using a Cohort-style Markov decision-tree economic model with a 30-year time horizon. The economic perspective was that of a third-party payer (Taiwan National Health Insurance System). Two treatment strategies were compared, namely ET and MT. The primary outcome was the incremental cost per quality-adjusted life year (QALY). Probabilities were obtained from meta-analyses. Costs were obtained from the published literature and Taiwan National Health Insurance System database. Multiple sensitivity analyses were performed to account for data uncertainty.

Results: The reference case revealed that the total cost of ET was \$NT 20,901 for 17.08 QALY per patient. By contrast, the total cost of MT was \$NT 21,171 for 17.15 QALY per patient. The incremental cost effectiveness ratio for ET versus that of MT was \$NT 3703 per QALY. The cost-effectiveness acceptability curve indicated that ET was comparable to MT at a willingness-to-pay threshold of larger than \$NT 35,000 per QALY.

Conclusion: This cost-effectiveness analysis indicates that ET is comparable to MT for treating chronic otitis media in Taiwan. This result provides the latest information for physicians, the government, and third-party payers to select proper clinical practice.

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Keywords: Chronic otitis media; Cost effectiveness; Endoscopy; Microscopy; Tympanoplasty

1. Introduction

Since the 1950s, microscopic tympanoplasty (MT), which can be performed through postauricular, endaural, and transcanal approaches, has been the standard surgery for repairing perforated tympanic membranes.^{1–5} Postauricular incision

enhances the visibility of the operative site, whereas the transcanal approach is reserved for patients with small tympanic perforations and wide ear canals.³ Therefore, MT through the postauricular approach is preferred globally.^{3–5} Despite having a high graft take rate (>90%), this technique frequently necessitates shaving, deep postauricular incision, and general anesthesia.^{3–6}

Endoscopic tympanoplasty (ET) has been increasingly practiced since the late 1990s.^{7–14} The major difference between MT and ET is the surgical view. The view during microscopic surgery is defined and limited by the narrowest segment of the ear canal, whereas transcanal endoscopy bypasses the narrowest ear canal

Conflicts of interest: The authors declare that they have no conflicts of interest related to the subject matter or materials discussed in this article.

* Corresponding author. Dr. Chih-Chieh Tseng, Department of Otolaryngology, Wan Fang Medical Center, 111, Section 3, Xinglong Road, Taipei 116, Taiwan, ROC.

E-mail address: doctsen@yahoo.com.tw (C.-C. Tseng).

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and provides a wider view, even when a 0-degree endoscope is used.^{8,9} Therefore, ET does not require canalplasty, postauricular incision, and general anesthesia; thus, it is less invasive than MT.^{7–14}

In recent years, health care systems need to conform to budgets and streamline resources to provide cost-effective quality care. Because of this budgetary limitation, physicians must understand the underlying expense associated with their medical service and select the most cost-effective treatments. Hence, a decision-analytic model that incorporates costs and outcomes can be used to analyze this medical question from a socioeconomic perspective.¹⁵

Although ET has been performed for decades, no studies on the cost-effectiveness of ET and MT have been published. Therefore, this study evaluated the cost-effectiveness of ET and MT for treating chronic otitis media. The results of this study provide objective evidence that enable decision makers to judiciously allocate medical resources.

2. Methods

2.1. Economic model

The economic perspective of this evaluation was that of the Taiwan National Health Insurance (NHI) System. The primary outcomes were incremental cost-effectiveness ratios (ICERs). The ICER is commonly used in equations in health economics to provide vital information for decision makers to allocate resources. It is the ratio of the change in costs to the change in effectiveness between the two strategies: (cost of strategy A – cost of strategy B/effectiveness of strategy A – effectiveness of strategy B). Therefore, the ICER provides the additional cost associated with the additional benefit of the new intervention being evaluated.¹⁵ We followed the guidelines of the Consolidated Health Economic

Reporting Standards (CHEERS) statement established in 2013.^{16,17}

This study contained only data from the published literature, and no patient data were used; therefore, institutional review board and ethics committee approval was not required.

2.2. Patient population

We assumed a hypothetical cohort of 1000 patients undergoing operations for treating simple chronic otitis media in hospitals in Taiwan in 2016. The definition of simple chronic otitis media was tympanic perforations without ossicular chain disease and cholesteatoma.

In this model (Fig. 1), patients with simple chronic otitis media received two comparative treatments, either ET or MT. Based on our previous study, ET was performed through a transcanal approach and under local anesthesia and intravenous sedation.¹⁴ MT was performed using a postauricular approach and under general anesthesia, according to a study by Wang et al.^{18–20} If the operations (ET or MT) were successful, the patients would achieve the status of patients with cured chronic otitis media. If the operations failed, the patients would either undergo reoperation or continue to have the status of patients with chronic otitis media. For patients receiving reoperations, if the reoperations were successful, the patients would achieve the status of patients with cured chronic otitis media. If the reoperations failed, the patients would continue to have the status of patients with chronic otitis media.

After completing the decision tree, the data of the patients was entered into the Markov model. The cycle duration was defined as 1 year. Based on Taiwan life expectancy statistics and assuming an average age of 50 years for patients with chronic otitis media, this Markov model was run for 30 cycles to reach an average age of 80 years.^{14,21} We assumed that

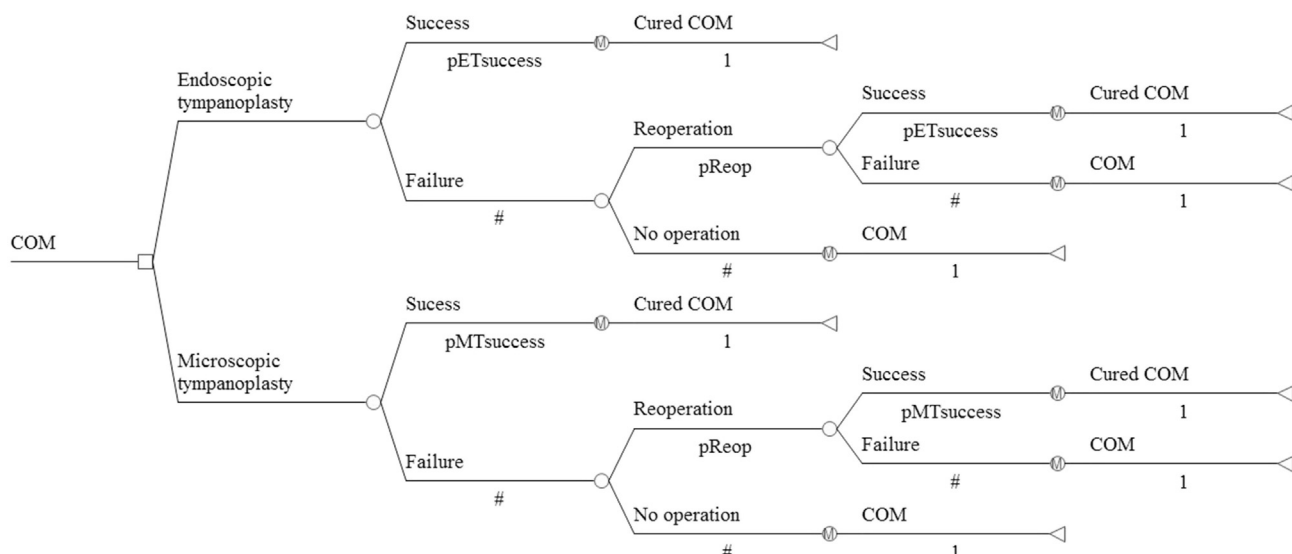


Fig. 1. Decision tree and Markov cycle for patients with simple chronic otitis media undergoing endoscopic tympanoplasty or microscopic tympanoplasty (COM: chronic otitis media).

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