

INPLASY

Endoscopic Sinus Surgery Effectively Improves Eustachian Tube Dysfunction in Patients with Chronic Rhinosinusitis: A Systematic Review and Meta-analysis

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ADMINISTRATIVE INFORMATION

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 11 August 2024 and was last updated on 11 August 2024.

INTRODUCTION

Review question / Objective The objective of the systematic review is to analyse the surgical impact on changes in ETD outcomes in CRS patients with confirmed preoperative ETD. Therefore, we conduct a meta-analysis on the effect of endoscopic sinus surgery for CRS patients with concurrent ETD symptoms.

Condition being studied The Eustachian tube (E-tube) equalizes pressure across the tympanic membrane, supplies air to the middle ear for ventilation, and acts as a channel for mucociliary clearance and sound protection. Paranasal sinuses and nasal cavity are situated in close proximity to the middle ear, which is connected to them by the E-tube. Therefore, considering its anatomic location, Eustachian tube dysfunction (ETD) is one of the more common otologic manifestations of chronic rhinosinusitis (CRS). The prevalence of otologic symptoms including aural fullness, hearing

loss, otalgia and tinnitus ranged from 15% to 42% in patients diagnosed with chronic rhinosinusitis. Chronic inflammatory response of sinonasal mucosa can lead to swelling of E-tube orifice, which can result in impairment of pressure equalization and dilatory functions of the E-tube.

METHODS

Participant or population Adult chronic rhinosinusitis patients with concurrent Eustachian tube dysfunction and had refractory response to conservative treatment for at least 3 months.

Intervention Endoscopic sinus surgery.

Comparator There is no comparative intervention available. The study measured continuous variables, namely mean preoperative and postoperative ETDQ7 scores.

Study designs to be included Studies describing concurrent ETD in patients with CRS treated by endoscopic sinus surgery were included in the final analysis.

Eligibility criteria The enrolled subjects were adult CRS patients (age > 18) who had an unsatisfactory response to medical therapy and concurrent ETD, which was primarily measured by ETDQ7.

Information sources Articles were identified through a comprehensive search of PubMed, Cochrane, Embase, and MEDLINE electronic databases.

Main outcome(s) Primary outcome measures are mean preoperative and postoperative ETDQ7 scores. The ETDQ7 consists of 7 items, with each question being rated on a scale from 1 to 7. Total scores range from 7 to 49, and a total item score cut point of ≥ 14.5 or a mean item score cut point of ≥ 2.1 indicates the presence of eustachian tube dysfunction.

Quality assessment / Risk of bias analysis The methodological quality and content validity of the recruited studies is assessed using the Newcastle-Ottawa Scale (NOS), which is designed to evaluate the risk of bias for non-randomised studies, including case-control and cohort studies. The NOS contains eight items, that are categorized into three broad perspectives: the selection of the study groups; the comparability of the groups; and the ascertainment of either the exposure (case-control studies) or outcome (cohort studies) of interest. A star system is implemented to allow semi-quantitative assessment of study quality. Two authors (K.S Yang and W.C Chen) used this instrument for study appraisal by awarding a maximum of one star for each item in the selection and outcome section, and a maximum of two in the comparability section if it was fulfilled. Scores on the NOS vary between 0 to 9 points. Studies with a total score of >6 are considered to have good methodological quality. Consensus was reached through discussion when there was a discrepancy between ratings. All the included studies were considered good methodological quality (total scores > 6). The funnel plot demonstrated all studies were within the funnel distribution except for two without symmetry, suggesting some publication bias based on visual inspection.

Strategy of data synthesis Meta-analysis of continuous measures, namely mean preoperative and postoperative ETDQ7 scores, was performed with Cochrane Review Manager (RevMan) version

5.4 (The Cochrane Collaboration 2020). Due to the variation between the enrolled studies such as target populations and mean outcome measures, random-effects model was used to run the analysis. The proportion was weighted according to the number of subjects in each study. The effect size of primary study outcome was quantified using standardized mean difference and 95% confidence intervals (CIs). Degree of statistical heterogeneity across studies was evaluated by I square and Cochrane's Q test. I square statistics of 25%, 50%, and 75% were estimated as low, moderate, and high heterogeneity, respectively.

Subgroup analysis Few studies have investigated independent predictors of ESS outcomes on CRS-related ETD, so only parallel comparisons could be drawn from the literature. This is the first analysis to discuss the response of ETD improvement in CRS patients following ESS based on clinical predictors. However, more outcome data is needed to conduct a subgroup analysis.

Sensitivity analysis We performed the sensitivity analysis through the one-study removal method to determine whether withdrawing any particular trial could cause a statistically significant difference in summary effect size. No statistically significant change in standard difference in mean was found when any one of the studies was excluded.

Country(ies) involved Taiwan.

Keywords Eustachian tube dysfunction; chronic rhinosinusitis; endoscopic sinus surgery; systematic review; meta-analysis; ETDQ-7.

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