Comparing CO₂ Laser and Microdrill in Primary Stapedotomy: A Systematic Review and Meta-Analysis of Postoperative Hearing Outcomes and Complications

Abstract:

Objective: The gold-standard treatment of otosclerosis is stapedectomy. Recent surgical advancements have led to the use of two approaches for stapedectomy: CO_2 laser and microdrill-assisted stapedotomy. There is limited data on the comparison of both interventions. This study aims to provide an update on evidence-based medicine on the use of CO_2 laser and microdrill in stapedotomy.

Materials and methods: A systematic review and meta-analysis were conducted using the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) Guidelines and an electronic search was conducted to identify studies comparing CO₂ laser versus microdrill for stapedectomy. Postoperative hearing outcomes and the rates of sensorineural hearing loss (SNHL) were identified as primary outcomes. Secondary outcomes included postoperative complications such as vertigo and abnormal taste sensation. The analysis was based on fixed or random-effects modelling.

Results: Four studies enrolling 1540 patients were identified. Postoperative hearing outcomes (Odds Ratio [OR]= 1.23, P=0.1), SNHL (OR= 0.8, P=0.74), and abnormal taste sensation post-operatively (OR= 0.84, P=0.58) were not significantly different between both interventions. However, a significant difference was found between both groups for post-operative vertigo, showing a higher rate for the microdrill group (OR= 2.54, P=0.02).

Conclusion: In conclusion, CO₂ laser and microdrill are both effective procedures for stapedectomy, as they both produced comparable outcomes in post-operative hearing outcomes and SNHL. However, microdrill had higher rates of post-operative vertigo, making the CO₂ laser a slightly more preferable option.