

Rate of tympanic membrane perforation after intratympanic steroid injection

Michael C. Topf MD¹; David W. Hsu MD¹; Douglas R. Adams BS²; Tingting Zhan PhD³; Stanley Pelosi MD¹; Thomas O. Willcox MD²; Brian McGettigan MD²; Kyle W. Fisher MD²

1. Department of Otolaryngology—Head and Neck Surgery, Thomas Jefferson University 2. Sidney Kimmel Medical College, Thomas Jefferson University 3. Department of Pharmacology and Experimental Therapeutics, Thomas Jefferson University

Abstract

Objectives: To determine the rate of persistent tympanic membrane (TM) perforation after intratympanic steroid injection. To determine which comorbid conditions and risk factors are associated with prolonged time to perforation closure following intratympanic steroid injection.

Study Design: Retrospective chart review

Methods: Clinical data were gathered for patients who had undergone intratympanic steroid injection to treat sudden sensorineural hearing loss or Ménière's disease. Primary outcomes analysis included the rate of persistent TM perforation, defined as perforation 90 days following last injection, and time to perforation healing. Age, sex, number of injections, smoking status, diabetes mellitus, previous head and neck irradiation, and concurrent use of oral steroids, were analyzed as potential predictors of persistent TM perforation.

Results: 192 patients were included in this study. Three patients (1.6%) had persistent TM perforations. All three patients with persistent TM perforations received multiple injections. One patient underwent tympanoplasty for repair of the persistent TM perforation. The median time to perforation healing was 18 days. When controlled for use of concurrent oral steroids, the healing time of those patients who received three or greater injections is 35% longer compared to those who received one or two injections. Patients with prior history of head and neck radiation therapy averaged 36.5 days for TM perforation healing compared to 17.5 days for patients with no prior history of radiation.

Conclusions: The rate of persistent TM perforation following intratympanic steroid injection is low. Patients who receive multiple injections and patients with a history of radiation to the head and neck may be at increased risk for prolonged time for closure of TM perforation.

Introduction

The use of intratympanic steroid injections has become increasingly more common in the treatment of various inner ear disorders with the rationale of locally delivering higher dosages to target tissues while avoiding adverse effects of systemic administration. Multiple protocols for intratympanic steroid treatment have been proposed. Some otologists advocate for the placement of a ventilation tube to facilitate repeated steroid injections.¹ Others have proposed placement of a MicroWick through a tube into the round window niche² or the placement of round window catheters.³ Some simply administer repeat transtympanic injections using a small gauge needle under local anesthetics.⁴

Complications of intratympanic steroid injection include persistent tympanic membrane (TM) perforation, otitis media, otitis externa, mastoiditis, hearing loss, vertigo, otalgia, dizziness, and dysgeusia.^{4,5} To our knowledge, there are few studies looking at the rate of TM perforation in the setting of intratympanic steroid injection, particularly when the transtympanic injection technique is utilized. Our goal was to examine the incidence of persistent TM perforation and to identify any risk factors that may contribute to a chronic perforation.

Methods and Materials

A retrospective review was conducted of patients undergoing intratympanic steroid injection at our department from 2009 to 2014. Patients included received at least one intratympanic steroid injection for the treatment of Ménière's disease or ISSNHL. Patients who received intratympanic aminoglycosides, with incomplete records or inadequate follow-up were excluded. Primary outcomes analysis included the rate of persistent TM perforation, defined as confirmed perforation 90 days following last injection, and time to perforation healing. Perforations were diagnosed via otoscopic examination and tympanometry. Age, sex, number of injections, smoking status, diabetes mellitus, previous head and neck radiation, and concurrent use of oral steroids were analyzed as predictors of persistent TM perforation and time to perforation healing.

Procedure: Our protocol takes place in the clinic under microscopic control. A drop of phenol is applied to induce local anesthesia. A ventilation hole is made with a 25-gauge spinal needle in the anterior inferior quadrant. A second hole is made and approximately 0.3 to 0.5 mL of 10 mg/mL dexamethasone is injected through a posterior inferior site. The patient is instructed to not speak, minimize swallowing, and to lie in the supine position keeping the treated ear upright for 30 minutes.

Results

192 patients with a mean age of 54.0 years and median follow-up of 56.0 days were included. 3 patients (1.6%) had persistent TM perforations at 90 days (Table I). Median time to TM perforation healing was 18.0 days (range 4—162 days). There was no statistically significant variable associated with time to perforation healing (Table II). However, patients with prior history of head and neck radiation therapy averaged 36.5 days for TM perforation healing, compared to 17.5 days for patients with no prior history of radiation ($p = 0.078$). Patients who received 1 or 2 injections had an average time to TM perforation healing of 16.5 days, compared to 31.0 days for those who received 3 or more injections ($p = 0.113$). When controlled for use of concurrent oral steroids, patients who received three or greater injections had a 35% longer healing time (mean ratio 1.35, $p = 0.064$), compared to those who had one or two injections.

Table I. Persistent TM Perforation Patient Information

Patient	Age	Sex	Risk Factors	# of Injections	Duration of Perf	Size of Perf	Repair
1	70	F	None	2	6 months	25-30%	Tympanoplasty
2	24	M	Smoker	3	3.5 months	Pinpoint	Lost to follow-up
3	71	F	Concurrent PO steroids	2	6 months	Pinpoint	Lost to follow-up

Table II. Time to Perforation Healing

	Patients	% of Total	Median time to healing (days)	p-value
Total Patients	192	100	18.0	
Gender				0.879
Male	106	55.2	15.0	
Female	86	44.8	20.0	
# of injections				0.113
1 or 2	159	82.8	16.5	
3 or greater	33	17.2	31.0	
Tobacco use				0.968
Current smoker	30	15.6	18.0	
Non-smoker	162	84.4	19.0	
Diabetes				0.656
Diabetic	28	14.6	14.5	
Non-diabetic	164	85.4	19.5	
Radiation therapy				0.078
Previous H+N RT	14	7.3	36.5	
No history of RT	178	92.7	17.5	
Steroids				0.116
Concurrent PO	61	31.8	15.0	
None	131	68.2	20.0	

Conclusions

- 1) Transtympanic injection of steroids for the treatment of Ménière's disease and ISSNHL is safe.
- 2) The rate of persistent TM perforation following intratympanic steroid injection is low.
- 3) Patients who receive multiple injections may be at increased risk for prolonged time for closure of TM perforation.
- 4) Patients with a history of radiation to the head and neck may be at increased risk for prolonged time for closure of TM perforation.

Contact

Michael C. Topf, MD
 Thomas Jefferson University Hospital
 Department of Otolaryngology—Head and Neck Surgery
 Email: michael.topf@jefferson.edu

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