SYSTEMIC SIDE EFFECTS OF TRANSTYMpanic STEROIDS
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ABSTRACT
Objective: Review largest series of patients treated with transtympanic steroids, including outcomes, steroid dosing and adverse outcomes. Review first reported cases of systemic side effects from transtympanic steroids.

Methods: A retrospective case series of 166 patients who underwent placement of transtympanic Silverstein tube with microwick for steroid administration was reviewed.

Results: 5/166 patients developed systemic side effects, 9/166 patients developed local side effects. 48/166 (29%) of patients had a persistent perforation after therapy. The percent of patients with improvement as a function of symptoms: hearing loss 42%, tinnitus 56%, vertigo 68%, aural fullness 25% and dysequilibrium 66%.

Conclusions: While our study revealed a significant risk of persistent tympanic membrane perforation, the incidence of systemic and local side effects from transtympanic steroid administration is low.

INTRODUCTION
Corticosteroids have traditionally been used to treat a variety of inner ear pathologies including sensorineural hearing loss and autoimmune disorders. Therapeutic effects of systemic steroids (i.e. via oral route) may not be ideal at non-toxic levels due to their limited ability to penetrate the blood-perilymph barrier. Transtympanic administration of steroids allows for steroids to be taken up into the perilymph directly through the round window membrane. Achieving adequate doses of steroids within the inner ear without the associated systemic side effects would be ideal; steroid therapy is acknowledged as the most effective treatment of sudden sensorineural hearing loss.2

Administration of steroids via a transtympanic route theoretically allows for relatively high perilymph concentrations without systemic absorption and the associated systemic side effects. Guinea pig studies have demonstrated higher perilymph concentrations of steroids with administration via the transtympanic as compared either the oral or intravenous routes.3

METHODS & MATERIALS
A retrospective review of all patients undergoing placement of a Silverstein tube with microwick in the practice of the senior author was performed. 221 patients were identified. Those patients that underwent microwick placement for aminoglycoside therapy or for eustachian tube dysfunction were excluded, leaving 166 patients. Diagnosis, age, gender, steroid dosage (maximum and mean dose), duration of therapy, outcomes, adverse side effects and presence of post-procedure perforation were recorded.

Hearing loss is considered improved if audiogram revealed 10dB improvement in the pure tone average or 20% improvement in word recognition score; dysequilibrium was evaluated objectively with posturography. Tinnitus, vertigo & aural fullness outcomes involve subjective patient self-assessment.

Procedures performed under local anesthetic. The myringotomies were made just over the round window, usually 3.44mm posterior and 113 degrees posteroinferior from the handle of the malleus. See Figure 2 below. Silverstein’s tube was placed followed by a microwick that measures 1mm in diameter and 9mm in length. Steroid was the perfused into the middle ear. Steroid doses were administered BID.

CONCLUSIONS
- Selection of steroid dose (average or maximum) does not appear to associated improved outcomes.
- Duration of steroid therapy does not appear to be associated with improved outcomes.
- While there is a significant risk of persistent perforation (29%), transtympanic steroids are associated with a small risk of adverse side effects [local (9%) and systemic (3%)].

REFERENCES