**ABSTRACT**

**Objectives:**
- Demonstrated case report of a patient with otologic complaints of ETD showing that Functional Endoscopic Sinus Surgery (FESS) results in both symptomatic and objective improvement on tympanogram with Toynbee maneuver.
- This is a case report of a patient being seen at a tertiary hospital in 2010. The patient had polyposid chronic rhinosinusitis. The patient was assessed with two runs of tympanometry: a run before and after Toynbee maneuver.
- Toynbee maneuver is performed by swallowing with an obstructed nose, which pressurizes the middle ear and functions a functioning Eustachian tube (ET). Pressure is measured by a shift in the tympanogram peak. The same test was repeated at 12 weeks and 22 weeks after surgery.

**Methods:**
- Preoperatively, there was no shift in the Tympanogram in either ear after the Toynbee maneuver. At the first post operative visit, our patient demonstrated a shift in the tympanogram after a Toynbee maneuver in the left ear. At the second visit, the patient demonstrated a shift in both ears. The patient also described subjective improvement in symptoms of ETD.

**Conclusion:**
- This study demonstrates that endoscopic sinus surgery in patients with chronic rhinosinusitis can improve symptoms of ETD. Improvement in ET function can be demonstrated by vigorous testing by shifts in the tympanogram curve after pressureization using the Toynbee maneuver. This suggests that a prospective study should be performed using subjective and objective measures of ET function in patients with otologic complaints and chronic rhinosinusitis. We feel that this unique test is clinically relevant and uses equipment readily available in a standard office rather than more expensive which are restricted to research laboratories.

**INTRODUCTION**

Otologic symptoms are common among patients with chronic rhinosinusitis and this has been attributed to Eustachian tube dysfunction (ETD). The evidence to support this has been limited to studies examining the role of nasal packing and septal surgery. Recent efforts have focused on the treatment of sinusosal disease to relieve ETD in the form of middle ear effusion. In addition, function endoscopic sinus surgery (FESS) has been demonstrated to have objective and subjective improvement on tympanogram with Toynbee maneuver.

**RESULTS**

**CASE REPORT**

A 45 year old female who presented to clinic in 2010 with symptoms of chronic rhinosinusitis. Endoscopy demonstrated chronic rhinosinusitis with polyps. She also had symptoms of ETD including aural fullness, pressure sensation and otalgia. She was initially treated with a course of medical therapy including intranasal corticosteroids, saline irrigation and a short course of oral steroids. She found the symptoms of ETD to be particularly bothersome and underwent tympanometry with Toynbee maneuver. (Figure 1)

After a trial of medical therapy, she underwent endoscopic sinus surgery. Repeat Toynbee testing was performed at 3 weeks (Figure 2) and 16 weeks (Figure 3) after surgery. After surgery she reported improvement in first her left ear and then her right ear.

As seen in the pre-operative tympanogram (figure 1), a normal run of tympanometry was performed, which would still be interpreted as within normal limits. However, with the Toynbee maneuver, she failed to change the pressure of her middle ear space first in the left ear (figure 2) and then in the right ear (figure 3). This correlated with symptomatic improvement in each ear. The Toynbee maneuver allows one to assess the ability of the ET to respond to pressure changes of the nasopharynx rather than a static picture of the middle ear space shown by normal tympanometry.

**DISCUSSION**

This study demonstrates that endoscopic sinus surgery in patients with chronic rhinosinusitis can improve symptoms of ETD. This novel test is performed by observing shifts in the tympanogram curve after pressureization using the Toynbee maneuver. This case also illustrates that the Toynbee test can be a useful adjunct in clinic for the evaluation of patients with symptoms of ETD in the setting of FESS. Function endoscopic sinus surgery has been demonstrated to have objective and subjective improvement on tympanogram with Toynbee maneuver. Having an objective test that correlates with resolution of ETD symptoms would be useful to clinicians when they counsel patients on their expectation after surgery. This suggests that a prospective study should be performed using subjective and objective measures of ET function in patients with otologic complaints and chronic rhinosinusitis. An objective test is becoming increasingly important as we explore endoscopic surgery on the opening of the ET.

One of the challenges with ET testing is what constitutes the gold standard in the assessment of the dynamic function of pressure equalization. A study performed by Uzun et al assessed the utility of the Toynbee maneuver and used signs and symptoms of barotrauma from diving as the gold standard in ET function of pressure regulation. Others have used the 9 step Bluestone inflation/deflation test as a gold standard. Further studies in patients with both chronic rhinosinusitis and ETD need to be performed to establish a gold standard and to validate the Toynbee test. As previously mentioned, other tests of Eustachian tube function are difficult to use clinically due to their complexity, time consumption and requirement of specialized equipment. The Toynbee maneuver is an easy to perform, and efficient test that can be performed in the majority of otolaryngologist’s office with equipment that is readily available.

**CONCLUSIONS**

We feel that a select group of patients with chronic rhinosinusitis suffer from symptoms of ETD which can be objectively measured using testing commonly available in an otolaryngologist’s office. These patients with otologic symptoms have improvement in their symptoms with endoscopic sinus surgery in addition to relief of their sinonasal complaints. We propose that improvements in their otologic symptoms is measurable by using a dynamic test of pressure equalization such as the Toynbee test. We hope to eventually demonstrate that chronic rhinosinusitis patients with chronic otitis media who demonstrate ear pathology in the form of retraction or cholesterolitis or fluid will show resolution of both sinonasal and otologic pathology after sinus surgery and that this will correlate with ET testing.

**REFERENCES**

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