

# Differential Diagnosis of Acute Otitis Media (AOM) from Secretary Otitis Media (SOM) through Tympanometry, Audiometry and Diapasonic Tests: Reporting two Cases with Acute Otitis Media

**Case Report**

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**Received:** January 27, 2015 | **Published:** April 15, 2015**Abstract**

Acute Otitis Media (AOM) is an infectious disease that may be experienced by both children and adults. Among its common symptoms, we can name fever, which is due to the infectious nature of the disease, and otalgia. Secretary Otitis Media (SOM) may occur due to nasal septum deviation, sinusitis, allergies, adenoid hypertrophy, cold and dysfunction of Eustachian tube and other conditions, leading to middle ear effusion. In this study, we deal with differential diagnosis of AOM from SOM in two patients recently afflicted with AOM. It is of high importance to differentially diagnose AOM from SOM, because likelihood of occurrence of labyrinthitis in AOM is higher than in SOM due to infectious nature of AOM.

**Keywords:** Differential diagnosis; Acute otitis media; Secretary otitis media; Hearing loss

**Introduction**

Differential diagnosis of Acute Otitis Media (AOM) [1] from Secretary Otitis Media (SOM) by the tests used in this study does not apply to these conditions: 1) the patients afflicted with SOM following AOM or vice versa (the patients with both conditions), making differential diagnosis demanding; 2) the patients experienced perforated tympanic membrane following AOM, or experienced labyrinthitis and slight to profound sensorineural hearing loss following either AOM or SOM; 3) the patients with a former history of hearing loss or ear diseases before affliction with AOM or SOM; 4) the patients afflicted with AOM for a long period, not being afflicted recently; 5) Weber test is useful only in unilateral AOM or SOM cases. It is necessary to note that the cases reported in this study were the patients suffered from AOM recently and had no former history of hearing loss.

AOM is an infectious disease that may be experienced by both children and adults. Among its common symptoms, we can name fever, which is due to the infectious nature of the disease, and otalgia. SOM may occur due to nasal septum deviation, sinusitis, allergies, adenoid hypertrophy, cold and dysfunction of Eustachian tube and other conditions, leading to middle ear effusion [2,3].

**Discussion**

There may be otalgia in SOM, but it is severer and more abrupt in AOM than in SOM. In some literature, it is stated that bulging is seen in AOM, but there is retracted malleus in SOM. It was, however, observed rarely according to my clinical experience.

Otoscopically, tympanic membrane is red and inflamed in AOM, a phenomenon seen in advanced SOM, making it hard to differentially diagnose them by otoscopy. Of course, redness and inflammation is severer in AOM than in SOM.

In AOM tympanometric and otoscopic tests are not consistent; i.e. tympanic membrane is red and inflamed in otoscopy and we expect Type B in tympanometry, but we encounter Type An with good static compliance, provided that the five conditions specified earlier are met.

In some AOM cases, positive pressure is seen in tympanometry. However, in many cases, positive pressure is present in tympanometry due to artifact of tympanometer or cry of the child. Presence of positive pressure in tympanometry, redness and inflammation of tympanic membrane and severe otalgia are among the symptoms of AOM. There is no positive pressure in tympanometry in some AOM cases and we have Type An tympanometry at the pressure of 0 daPa, which has been reported in case report No. 2.

Conductive hearing loss is not seen in AOM provided that the five conditions are met, but it is present in advanced SOM due to middle ear effusion. In diapasonic or audiometric Weber Test is lateralized towards the affected ear in unilateral SOM, but it is not lateralized in the affected ear in unilateral AOM.

Weber test is one of the best tests for differential diagnosis [4,5] of unilateral AOM and unilateral SOM. Rinne diapasonic test will be negative in SOM with remarkable conductive hearing loss, but it will be positive in AOM, as reported in the case reports. Ipsi and contra acoustic reflexes will be absent in AOM like in advanced SOM.

In cases where unilateral AOM leads to perforation of tympanic membrane, Weber test will be lateralized towards the affected ear due to the occlusion effect, provided that other ear is normal, and if perforated tympanic membrane and otorrhea has led to remarkable conductive hearing loss, Rinne diapasonic test will be negative [6-8].

## Case Reports

### Case report 1

A 6 years old child referred to our clinic, complaining of severe left otalgia. In otoscopy, right ear was completely normal, but left tympanic membrane and malleus were completely red and inflamed. In tympanometry of right ear, there was Type An at the pressure of 0 daPa and acoustic reflexes (IPSI and contra) were present. In left ear, there was Type An tympanometry with SC= 0.7 cc at the pressure of +50 daPa, and acoustic reflexes were absent in left ear.

Diapasonic Weber test was performed three times, and it was heard in the midline. Audiometry indicated normal hearing in both ears. In PTA test of left ear, the child's hearing was under 0 dB in most frequencies. Rinne diapasonic test was performed three times, which was positive at each time (Figure 1).

### Case report 2

A 30 years old woman referred to our clinic, complaining of severe otalgia, tinnitus, hearing loss in right ear, and vertigo. The patient stated that she experienced all problems within one day. In otoscopy, right tympanic membrane and malleus were bloody in color. Otoscopy of left ear indicated normal tympanic membrane. In tympanometry test of both ears, there was Type An at the pressure of 0 daPa, and IPSI acoustic reflex was present in left ear, but absent in right ear. As mentioned earlier, inconsistency

between otoscopy and tympanometry in this patient with severe otalgia is indicative of AOM, which makes diagnosis of AOM definite (Figure 2).

PTA test of left ear indicates normal hearing, but there was sensorineural hearing loss with SRT= 65 dB in right ear. Air bone gap and conductive hearing loss were not seen in right ear. Dynamic range was limited in right ear due to hyperacusis; SRT= 65 dB and UCL= 75 dB. The patient suffered from labyrinthitis and abrupt sensorineural hearing loss probably due to AOM.

The physician prescribed ciprofloxacin for treatment of the patient's AOM and corticosteroid therapy for treatment of abrupt sensorineural hearing loss. In next refer, otalgia was cured. In otoscopy, tympanic membrane was improved, but there still was redness in some parts of it. Tinnitus and vertigo were decreased. IPSI reflex of right ear, which was absent in previous session, was present. SDS of the patient's right ear was poor in the first session, which fortunately reached 76% after a cycle of corticosteroid therapy (Figure 3). SRT of right ear reached 45 dB, dynamic range improved relatively, SRT= 45 dB and UCL= 60 dB.

Corticosteroid therapy continued by the physician for some more periods (Figure 4), but in the last session, the patient had sensorineural hearing loss with SRT= 30 dB, tympanic membrane was normal, the vertigo was cured, but the patient still complained of tinnitus and hyperacusis in right ear. The patient's SDS was 100% in the last session and dynamic range was SRT=30, UCL=60 dB.

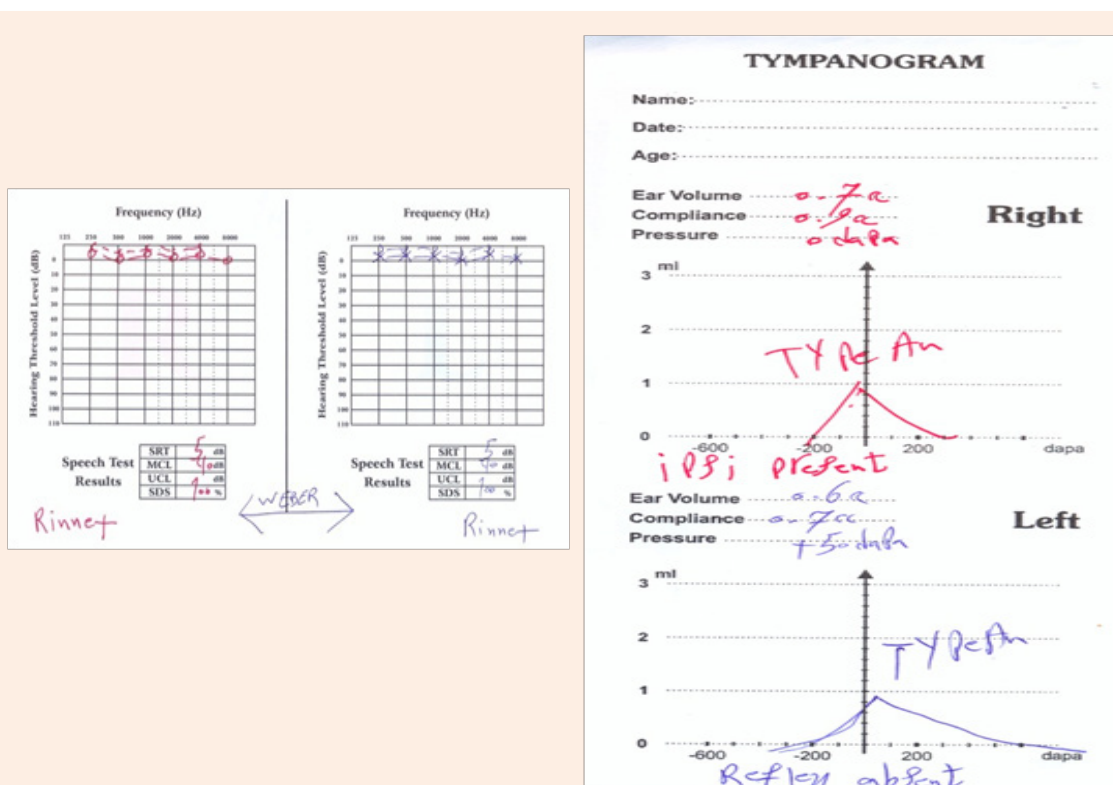


Figure 1: Audiogram and Tympanogram of Case No 1.

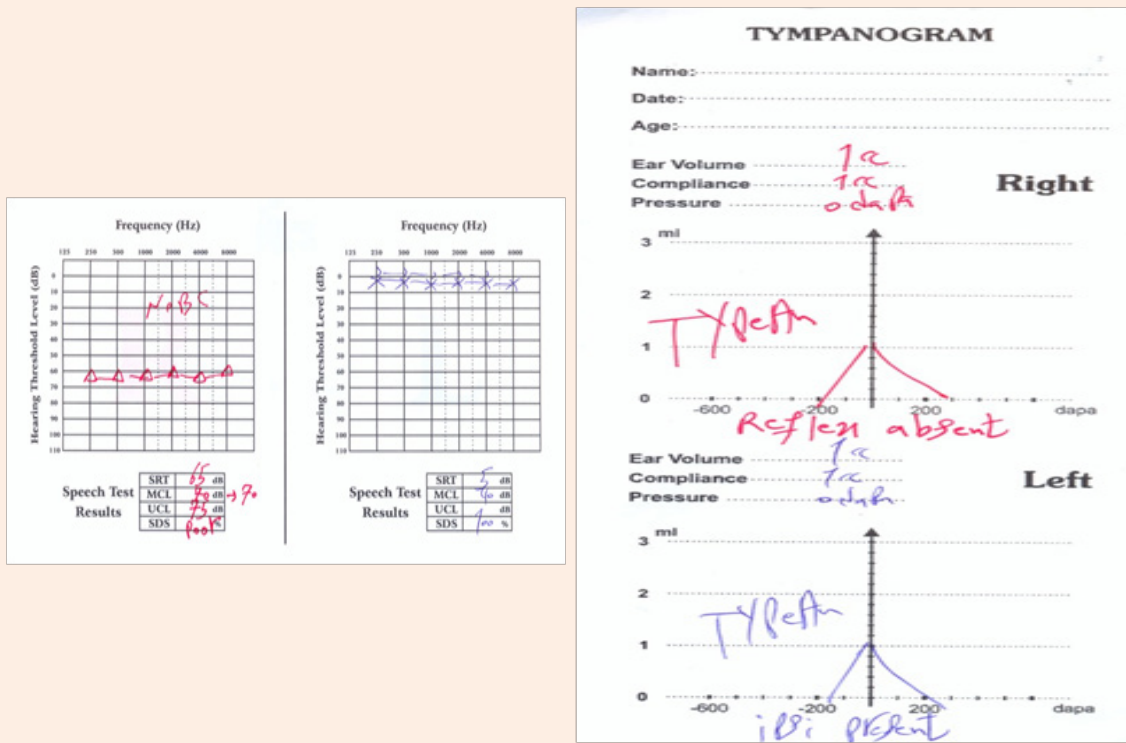


Figure 2: Audiogram and Tympanogram of Case No.2 (Before Treatment).

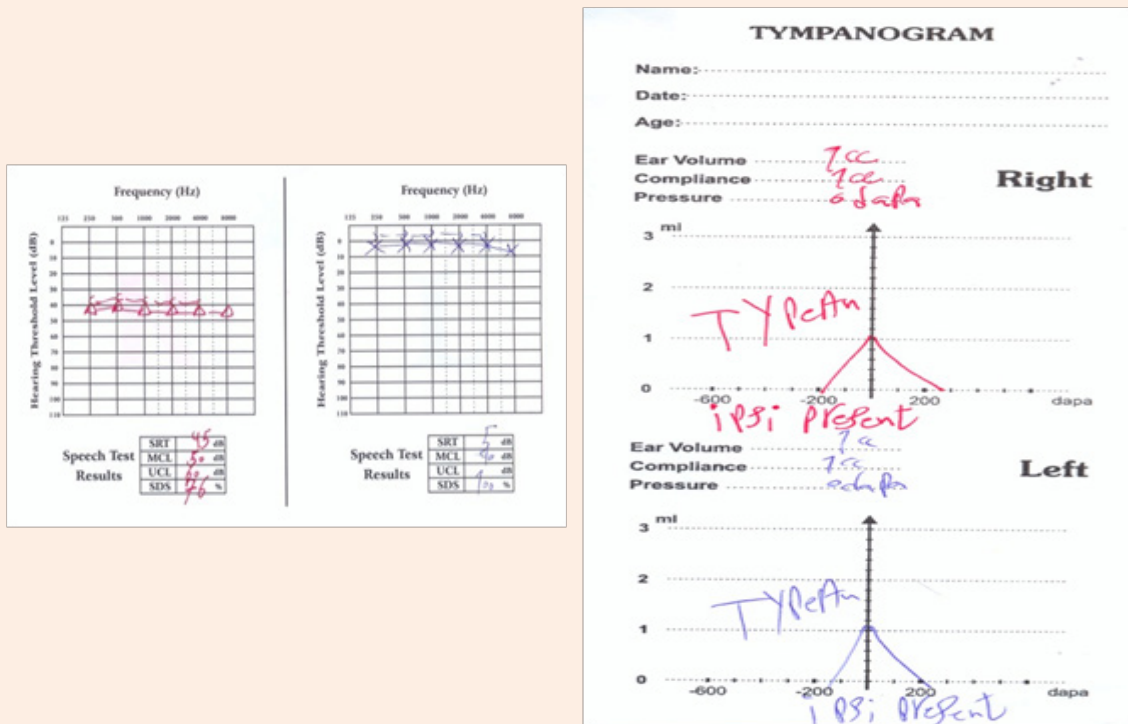


Figure 3: Audiogram and Tympanogram of Case No. 2 (After Treatment for One Period).

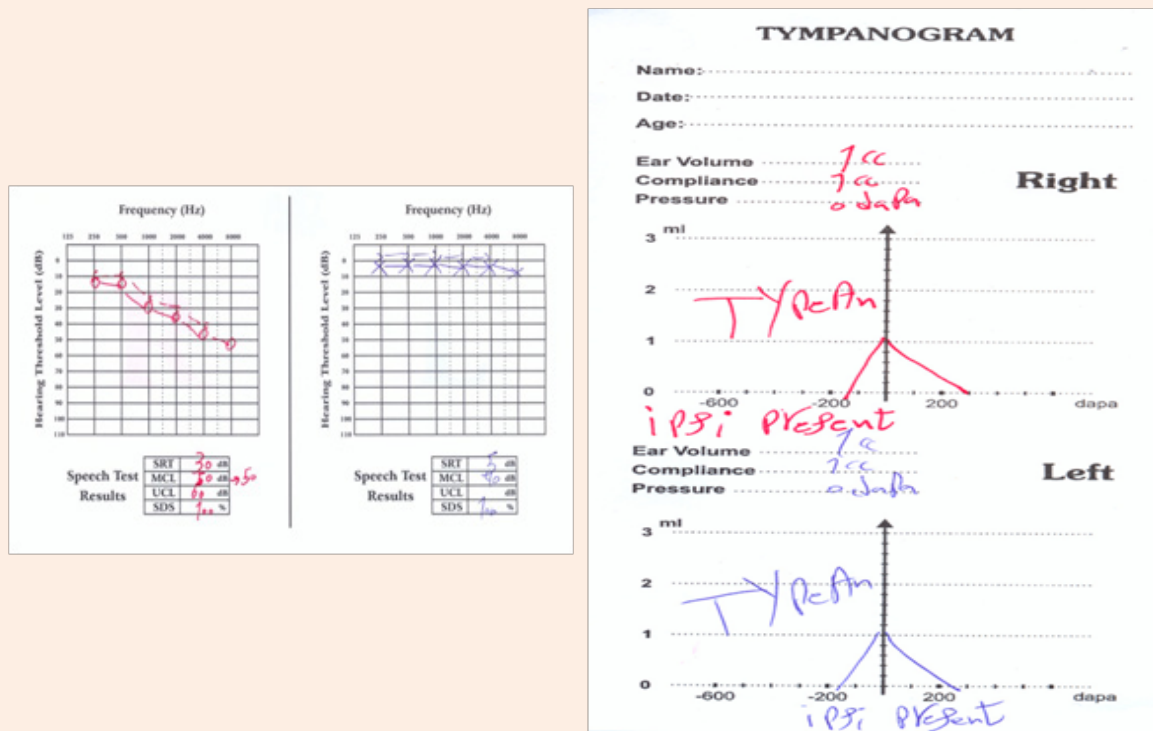


Figure 4: Audiogram and Tympanogram of Case No. 2 (After Treatment for Some Periods).

### Conclusion

According to this study, we could name AOM Otitis Media without effusion in the beginning of the disease. But if infection penetrate to the Tympanic Cavity result would be resembled as

Table 1: Comparison of AOM with SOM by Audiology Tests.

	Otосcopy	Tympanometry	Acoustic Reflex	Rinne Test	Weber Test	Pta Test
Acute Otitis Media (AOM)	Red (Bloody) Tympanic membrane	Type An with Positive Pressure or 0 daPa	Absent	+	In Midline or AOM Opposite Ear	Normal
Advanced Secretary Otitis Media (SOM)	Red Tympanic membrane	Type B- C2- AS	Absent	-	In SOM Ear	Conductive Hearing Loss

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