Introduction to Tympanometry

This is an introduction to understanding and reporting on tympanometry measurements. This guide should be used in conjunction with your own clinic's protocols and current research in the area of acoustic immittance testing.

Some Useful Terminology

Ear Canal Volume

"The equivalent ear canal volume (ECV) is an estimate of the volume of air medial to the probe, which includes the volume between the probe tip and the tympanic membrane if the tympanic membrane is intact, or the volume of the ear canal and the middle ear space if the tympanic membrane is perforated" (Fowler & Shanks, 2002, p. 180).

Averages

Children 3 – 5yrs: 0.4cc to 1.0cc

Adults: 0.6cc to 1.5cc

Ear canal volume with an ECV >2.0 with a type B tympanogram in children suggests a perforated TM

or patent grommet.

Very small ECV with a type B tympanogram suggested impacted wax or middle ear pathology (glue

ear?).

Tympanometric Peak Pressure/Middle Ear Pressure

Tympanometric peak pressure (TTP) or middle ear pressure (MEP) is the ear canal pressure at which the peak of the tympanogram occurs (Margolis & Hunter, 2000).

Static Compliance

Static compliance (SC) "is the greatest amount of acoustic energy absorbed by the middle ear system (the vertical peak of the tympanic tracing)" (Onusko, 2004, p. 1716).

Gradient

"Tympanogram gradient is an objective measure that describes the steepness of the slope of the tympanogram near the peak" (Fowler & Shanks, 2002, p.182). The gradient is not commonly used in Australia to analyse tympanograms.
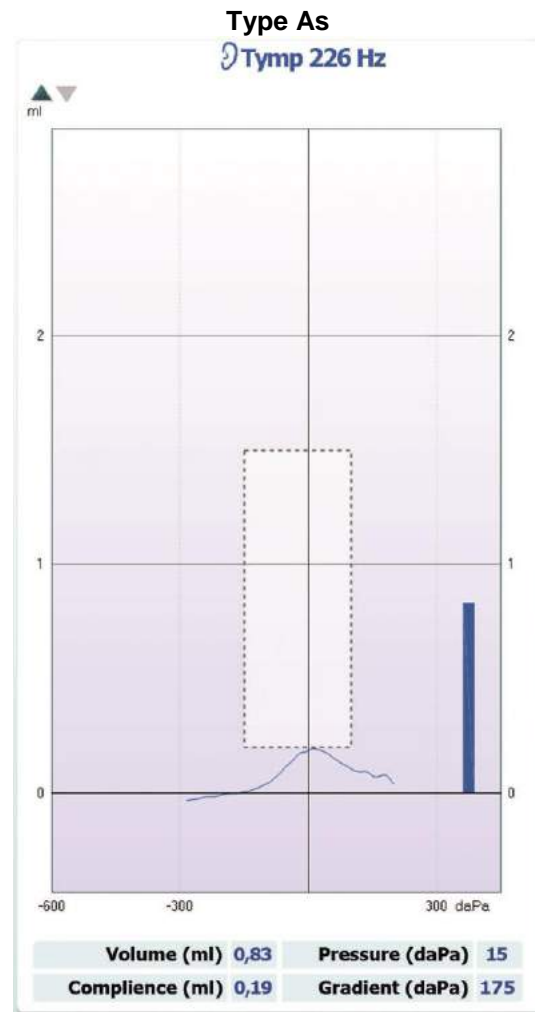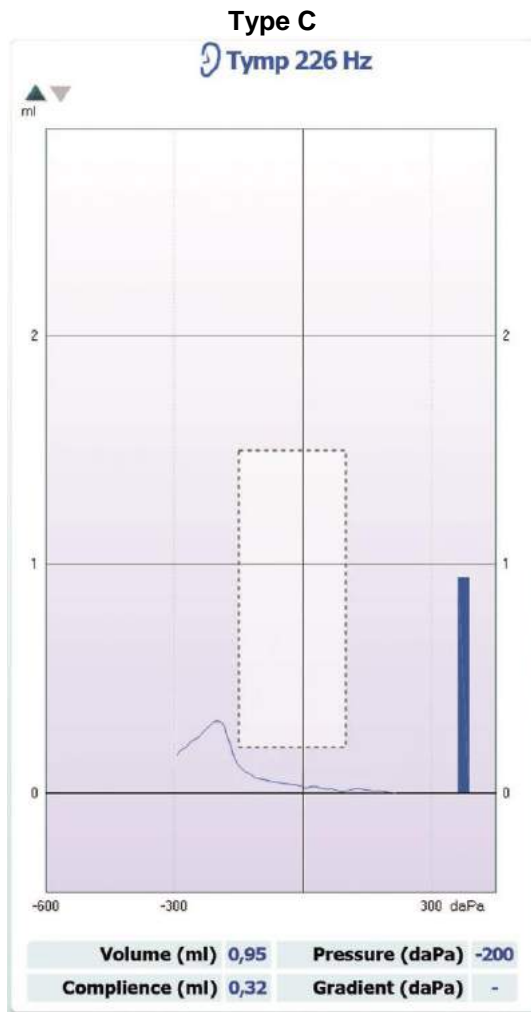
TYPANOGRAM TYPES (as proposed by Jerger)

Type A	Type B
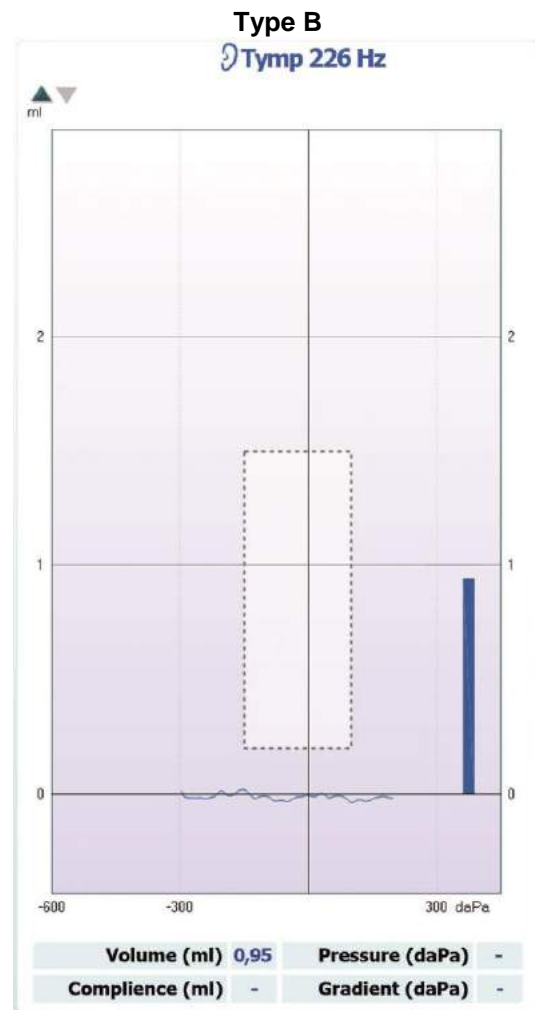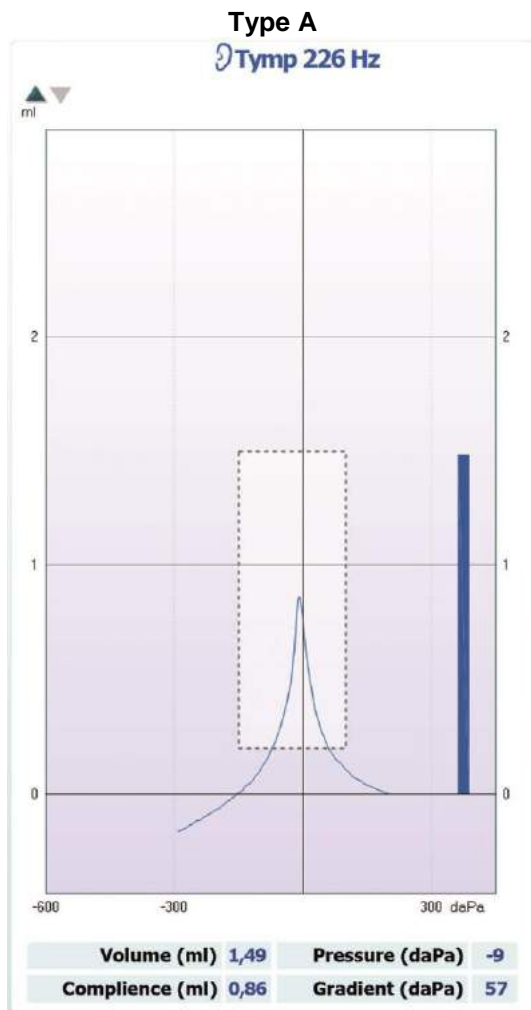
Type A Characteristics

- Sharp peak

- MEP between +50 to -99 mmH$_2$O

- SC = 0.3 to 1.6cc (adults)/0.2 to 0.9cc (children 3 – 5 yrs)

- ECV within normal range

Type B Characteristics

- Rounded line/no peak

- Usually no measureable/reduced MEP or SC

- ECV within normal range
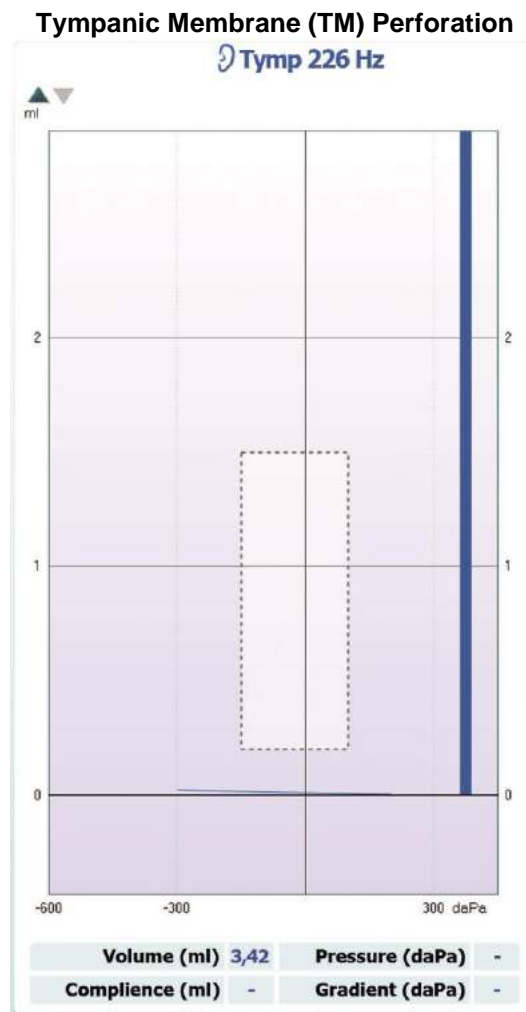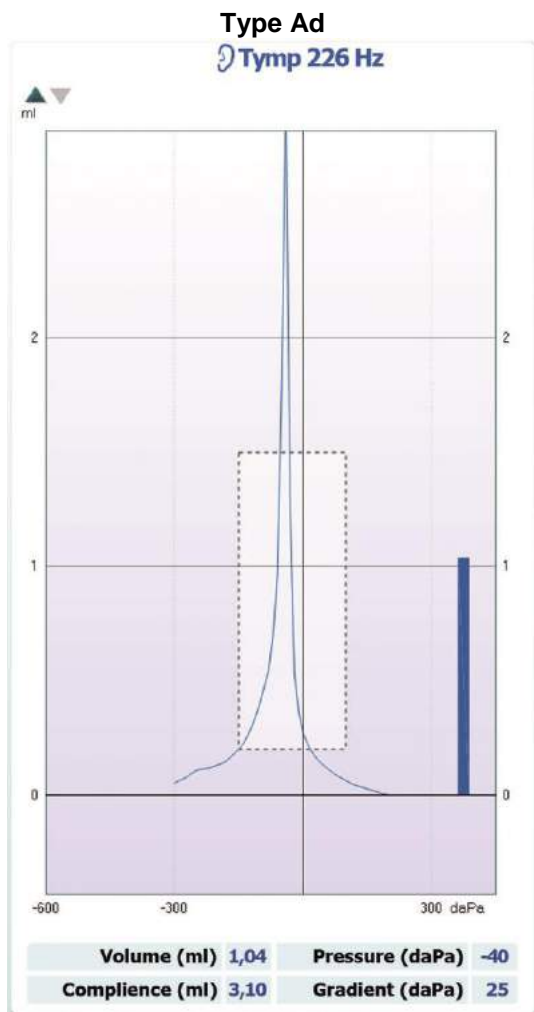
Type C

Type As

Type C Characteristics

- Sharp peak

- MEP less than -99mm (significant negative MEP)

- SC = 0.3 to 1.6cc (adults)/0.2 to 0.9cc (children 3 – 5 yrs)

- ECV within normal range

Type As Characteristics

- Sharp peak

- Normal MEP

- SC < 0.3cc (adults) (hypomobile)

- ECV within normal range

Type Ad

Volume (ml)	1,04	Pressure (daPa)	-40
Complience (ml)	3,10	Gradient (daPa)	25

Tympanic Membrane (TM) Perforation

Volume (ml)	3,42	Pressure (daPa)	-
Complience (ml)	-	Gradient (daPa)	-

Type Ad Characteristics

- Sharp peak

- Normal MEP

- SC > 1.6cc (adults) (hypermobile)

- ECV within normal range

TM Perforation Characteristics

- Rounded/flat line (no peak)

- Usually no measureable/reduced MEP or SC

- Large ECV (as measurements takes into consideration middle ear cavity)

N.B. Classification of tympanogram types differ between many clinics and audiologists. This is a guide only and should be used in conjunction with your own research and clinical protocols.

Reasons for repeating Tympanometry
- Client swallows, talks, laughs, coughs etc during the test
- You get an odd result that doesn't look correct or doesn't match audiogram findings. When in doubt, repeat the test to check your results are repeatable.

Reporting

These are some common sentences used to report on tympanometry results.

N.B. Tympanometry results should be looked at in conjunction with other audiological results in the test battery (audiometry, speech audiometry etc) when giving recommendations/impressions in reporting.

Type A
Tympanometry showed normal middle ear pressure and static compliance.

Type B
Tympanometry showed no measureable middle ear pressure or static compliance, consistent with middle ear pathology.

Type C
Tympanometry showed significant negative middle ear pressure in the presence of normal static compliance, consistent with Eustachian tube dysfunction/middle ear pathology.

Type As
Tympanometry showed normal middle ear pressure with decreased static compliance, consistent with a hypomobile tympanic membrane.

Type Ad
Tympanometry showed normal middle ear pressure with increased static compliance, consistent with a hypermobile tympanic membrane.

Large ECV
Tympanometry results showed a large ear canal volume, consistent with a tympanic membrane perforation or patent grommet.

Other Resources

http://www.audiologyonline.com/askexpert/display_question.asp?question_id=451

http://www.audiologyonline.com/articles/article_detail.asp?article_id=393

http://www.audstudent.com/tutorials/tymp2/TympClinApp.htm

http://www.asha.org/docs/html/RP1988-00027.html

http://www.audiologyonline.com/ask-the-experts/why-y-axis-on-tympanograms-1306

References

Fowler, C. G., & Shanks, J. E. (2002). Tympanometry. In J. Katz (Ed.), *Handbook of clinical audiology* (5th ed.). (pp. 175 – 204). Baltimore: Lippincott   Williams & Wilkins.

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Onusko, E. (2004). Tympanometry. *American Family Physician, 70 (9*), 1713 – 1720.

Srireddy, S. V., Ryan, C. E., & Niparko, J. K. (2003). Evaluation of the patient with hearing loss. In J. Niparko & L. R. Lustig (Ed), *Clinical neurotology: Diagnosing and managing disorders of hearing, balance and the facial nerve.* (pp. 65 – 80). London: Martin Dunitz Publishing.

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