Comparison of Insertion and Functional Gain in Hearing Aid Users

Niladri Shankar Roy C.
Student, A.I.I.S.H, Mysore

The study was undertaken to investigate whether functional gain and insertion gain measures were comparable in body level hearing aid users. The data was collected from fifteen subjects (twenty five ears) having moderate-to-severe degree of sensori-neural hearing loss.

The data was collected in a clinical setting. Separate sound treated rooms were used to measure the functional gain and the insertion gain. Both the measurements were done at 0° azimuth with the speaker distance and height kept constant from the subjects.

For functional gain, a two-room situation was used. It was measured using the Madsen OB822 audiometer connected to a speaker (COSMIC COVOX 4500) through an amplifier (COSMIC C0 100 DELUXE MK-II). Unaided unaided thresholds were obtained for warble tone at the octave frequencies of 250Hz, 500Hz, 1000Hz, 2000Hz and 4000Hz in one dB steps. Functional gain was measured as the difference in unaided and aided auditory threshold converted to dBSPL. Insertion gain was measured in a single sound treated room. A sweep frequency warble tone was used to obtain the insertion gain. This was obtained using Madsen Insertion Gain Optimizer (IGO) 1000. The values at the octave frequencies 250Hz to 4000Hz were taken. Insertion gain was obtained as the difference in unoccluded and occluded threshold. The data for functional gain and insertion gain were obtained in a single session for each subject.

The results indicated that functional gain was always higher than insertion gain at all frequencies except at 2000Hz. The mean difference between the two were 15.56 dBSPL for 250Hz, 12.34 dBSPL for 500Hz, 3.92 dBSPL for 10OOHz, 1.22 dBSPL for 2000Hz and 5.78 dBSPL for 4000Hz. Overall mean difference between functional gain and insertion gain was 7.28 dBSPL. At 250Hz and 500Hz there were significant differences between functional gain and insertion gain. Similar result have been obtained for ear level hearing aids by Tecca and Woodford (1987). This difference at the lower frequencies can be explained by the possible leakage of some frequencies when the probe and earmould are inserted together and the difficulty in putting the probe in the ears with curved or narrow canals when doing insertion gain.

At higher frequencies, that is, 1000Hz, 2000Hz, 4000Hz there were no significant differences between functional gain and insertion gain. Therefore either method could be used to obtain real ear gain in individuals with moderate to severe sensori-neural hearing loss.