9. SUMMARY

This study was done to evaluate the usefulness of preoperative High Resolution Computed Tomography (HRCT) temporal bone measurements in predicting the visualization of round window during cochlear implant surgery.

A total of seventy pediatric (below 6 years) cochlear implant candidates were included. Two patients with congenital anomalies of the inner ear have been excluded from the study.

The distance between the tip of short process of incus and round window membrane, distance between oval window and round window membrane, anterior angle of basal turn of cochlea were measured pre-operatively on the HRCT temporal bone images. These measurements were used to predict the visibility of round window during surgery.

The visualization of round window through the facial recess during surgery was classified into fully visible (Type 1), partially visible (Type 2) and difficult to visualize (Type 3).

The mean and standard deviation of distance between the tip of short process of incus and round window membrane for types 1, 2 and 3 was 7.4 ±0.2mm, 6.9 ±0.2 mm and 6.4 ±0.2 mm respectively. The measurement showed significant difference between the three types of visualization of round window.
The mean and standard deviation of distance between oval window and round window membrane for the types 1, 2 and 3 was 1.4±0.2mm, 1.9±0.2mm, and 2.5±0.2mm respectively. The measurement showed significant difference between the three types of visualization of round window.

The mean and standard deviation of anterior angle of basal turn of cochlea for types 1, 2 and 3 was 58±4°, 58 ± 5°, and 59 ± 4° mm respectively. The angle did not show significant difference between the three types of visualization of round window. Hence, the anterior angle of basal turn of cochlea was not useful in predicting the visualization of round window.

The sensitivity, specificity, PPV and NPV for distance between the tip of short process of incus and round window membrane in predicting the visualization of round window was 98 %, 93%, 98% and 93% respectively.

The sensitivity, specificity, PPV and NPV for distance between oval window and round window membrane in predicting the visualization of round window was 98%, 93%, 98% and 93% respectively.

The cut off value for distance between the tip of short process of incus and round window membrane was 6.5 mm. The distance below 6.5 mm suggested round window was difficult to visualize.
The cut off value for distance between oval window and round window membrane was 2.4 mm. The distance greater than 2.4 mm suggested round window was difficult to visualize.

The distance between oval window and round window membrane showed good correlation between preoperative HRCT and intraoperative surgical measurement.

**In difficult to visualize cases (Type 3), the following observations have been made:**

The distance between the tip of short process of incus and round window membrane was found to be reduced on preoperative HRCT scan of temporal bone for type 3 as compared to other types of visualization (Types 1&2).

The distance between oval window and round window membrane was found to be increased on pre-operative HRCT scan of temporal bone for type 3 as compared to other types of visualization (Types 1&2).

Our study found that in difficult to visualize cases (Type 3), the round window was placed closer to the pyramid near the descending segment of the facial nerve. In such cases, the fracture and anterior displacement of bony external auditory canal was required for clear visualization of round window.