DEFINING THE LEVEL OF ABNORMAL ECOG IN A NEUROTOLOGY PRACTICE

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ABSTRACT

The objectives of the current study are to (1) identify the different levels of sensitivity and specificity of electrocochleography (ECOG) in our laboratory setting as normal or abnormal SP/AP ratio; and (2) select the level of specificity as the desired parameter of the abnormal SP/AP ratio of ECOG.

This retrospective study reviews 61 patients undergoing ECOG in our vestibular laboratory who were diagnosed with unilateral endolymphatic hydrops (Meniere’s syndrome or cochlear hydrops) on the basis of clinical findings, audiogram, and vestibular studies. Sensitivity and specificity levels of ECOG in our laboratory are reported across various SP/AP ratios.

Sensitivity and specificity levels of ECOG obtained in our vestibular laboratory are demonstrated for SP/AP ratios ranging from greater than 30% to greater than 50%. These data are the following: (1) greater than 30% (sensitivity, 0.72; specificity, 0.57); (2) greater than 35% (sensitivity, 0.66; specificity, 0.84); (3) greater than 40% (sensitivity, 0.52; specificity, 0.92); (4) greater than 45% (sensitivity, 0.43; specificity, 0.90); (5) greater than 50% (sensitivity, 0.29; specificity, 0.98).

Inherent inter-site testing variability requires that each laboratory should set its own level of abnormality for ECOG. This study demonstrates sensitivity and specificity for ECOG at different ratios. For our use as a confirmatory test, we selected 80% sensitivity and set 35% as our abnormal SP/AP ratio.

METHODS & MATERIALS

Participants
Retrospective chart analysis of 61 patients diagnosed with unilateral endolymphatic hydrops (Meniere’s syndrome or cochlear hydrops) and normal hearing sensitivity in the asymptomatic ear on the basis of symptomology and neurotologic clinical findings, audiogram, and vestibular studies (i.e., videonystagmography, rotary chair, posturography, vestibular evoked myogenic potentials).

Stimuli:

| Stimulus Parameters |
|---------------------|----------------|
| Stimulus Type       | Broad-band Click |
| Duration            | 100 usec |
| Intensity           | 30 dB N HL |
| Polarity            | Alternating |
| Stimulus Rate       | 11.3 clicks/sec |
| Masking             | None |
| Transducer          | Tiptrodes |

Collection Protocol:

- Two Channel Tiptrode Recording
  - Horizontal
  - Vertical
  - Test Ear = Active
  - Non-Test Ear = Active
  - Test Ear = Reference
  - Test Ear = Reference
  - Fpz = Common
  - Fpz = Common

Data Reduction & Analysis:
Utilizing a Biologic Auditory Evoked Potential system (version 6.2), the ECOG waveforms and SP/AP ratios were analyzed by locating the peak amplitudes of the summating potential and the action potential, similar to previous research.1-3

Analysis:
Sensitivity and specificity levels were obtained by analyzing the true and false positive and negative outcomes of the ECOG results across the various SP/AP ratios as related to the diagnosis of endolymphatic hydrops.

RESULTS

Figure 2. Sensitivity and Specificity levels of the SP/AP Ratios of ECOG in patients diagnosed with endolymphatic hydrops.

DISCUSSION

Obvious technical variability of ECOG, including but not limited to equipment, electrode type/placement, parameters, experience of provider, patient case history, and hearing severity of patient may affect accurate SP/AP ratios of ECOG thereby hindering the clinical process in the diagnosis of endolymphatic hydrops. Despite suggestions that lowering the level of the SP/AP ratio could negate specificity outcomes, the results of the current study with 88% specificity demonstrate otherwise. Therefore, it is reasonable to postulate that each laboratory should set its own level of abnormal SP/AP ratio for clinical diagnoses of endolymphatic hydrops in its own patient population. With the inclusion of a previous study’s data reduction techniques (i.e. SP/AP area ratio)1, future studies could include sensitivity and specificity levels of ECOG while utilizing altered collection protocols, similar to the current study.

CONCLUSIONS

• Using the clinical diagnosis of endolymphatic hydrops as the “gold standard”, this study demonstrates different levels of sensitivity and specificity for ECOG depending on the selected abnormal SP/AP ratio.

• Since we prefer to use ECOG as a confirmatory test, we selected 80% specificity as the desired parameter and have set 35% as the level of abnormal SP/AP ratio in our laboratory.

REFERENCES