

Stablishing Correlations Between the Cervical Auscultation and EMGS Involved in Swallowing



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Submission: May 06, 2019; **Published:** May 16, 2019

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Abstract

Introduction: Cervical auscultation (CA) is a complementary method of swallowing clinical evaluation and surface electromyography (EMGs) involves the electric potential of skeletal muscle fibers.

Objective: Associating acoustic data of CA with EMGs of the muscles involved in pharyngeal phase of swallowing without disturbances.

Method: This is a cross-sectional study approved by Research Ethical Committee 1.389.050. All participants signed the informed consent form. Cervical auscultation was analyzed through the DeglutiSom® software and the electromyographic activity during swallowing by Miotec® EMGs by swallowing 90 ml of water. The quantitative variables were expressed as means and standard deviation. The Student's t-test was used to compare means. The association between variables was evaluated by the Pearson correlation coefficient. The level of significance adopted was 5% ($p < 0.05$).

Result: Sixty adult participated in this study. The mean age was 23.69 (SD \pm 4.7). We found that the higher mean frequency of the auscultation peak, lower was the average of the supra-hyoid muscle peaks; and the higher intensity of the auscultation, higher was the peak, and the average of the supra-hyoid muscle. The peak muscle activity of the supra-hyoid region was larger than the peak muscle activity of the infra-hyoid region for swallowing 90 ml of uninterrupted water. The average peak frequency of CA was significantly greater in women than it was in men.

Conclusion: The acoustic swallowing parameters in healthy individuals are associated with the electrical activity of muscles involved in the pharyngeal phase of swallowing. These data complement the clinical swallowing evaluation and collaborate for the most accurate diagnosis. Stablishing correlations between the CA with EMGs involved in swallowing.

Keywords: Swallowing; Deglutition Disorders; Auscultation; Electromyography; Acoustics; Sound Spectrograph

Abbreviations: CA: Cervical Auscultation; EMGs: Surface Electromyography

Introduction

CA is a complementary method of clinical evaluation of dysphagia that enables one to listen to these sounds of swallowing [1,2]. Sounds to be auscultated are picked up by amplification instruments. Subsequently, they may be transferred to computerized programs, which carry out an acoustic sound analysis. This provides quantitative and visual data related to the amplitude, duration, and sound frequency, besides suggesting normalcy or swallowing impairment [3-5]. In the clinical evaluation, differences in cervical auscultation sounds of individuals without complaints of disturbances of swallowing were found. These may be influenced by various factors, such as age, consistency, volume offered, and anatomical inter-subject differences [6,7]. EMGs is a method for assessing the supplementary muscle group that may serve as a basis for comparing physio pathological conditions of muscles involved. This may confirm activation of certain muscle groups to execute specific tasks. There is no consen-

sus on the difference in time and amplitude of muscle activity between sexes in an electromyographic evaluation [8,9]. To link the acoustic data from CA with muscle electrical activity in the pharyngeal phase of swallowing this study was conducted with women without complaints of inconvenience.

Conclusion

The results showed the frequency and intensity captured by cervical auscultation were 689 Hz and 42.6 dB, respectively. The peak EMGs of the suprahyoid muscle was 125.3 μ V and the mean peak was 38.1 μ V. These data analysis revealed that the greater the mean frequency of the peak, the lower were the mean peaks of the suprahyoid muscle, and the greater the intensity, the greater were the peak and the mean peaks of the suprahyoid muscle. In conclusion, the acoustic swallowing parameters in healthy individuals was associated with the electrical activity

of muscles involved in the pharyngeal phase of swallowing. The average peak frequency of auscultation was significantly greater in women than it was in men. It was possible to demonstrate that the peak of the suprahyoid muscle activity was significantly higher than the peak of infrahyoid muscle activity while swallowing 90 ml of water.

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DOI: [10.19080/GJO.2019.20.556030](https://doi.org/10.19080/GJO.2019.20.556030)

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