Initiation and Closure of Larynx during the swallow in patients post-stroke

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Abstract

a. Purpose: As bolus enters the pharynx during the swallow, laryngeal closure takes place by approximating the epiglottis to the arytenoid. This mechanism continues until the swallow is completed in order to protect the airway. The purpose of this study is to measure initiation of laryngeal closure (ILC) and laryngeal closure duration (LCD) in three groups of subjects: a) Ten stroke patients who aspirate before and during the swallow (aspirators), b) Ten stroke patients who do not aspirate (non-aspirators), and Ten control group. b. Method: Means and standard deviation of ILC and LCD were analyzed in both 5ml and 10ml thin liquids using 100msec timer on videofluoroscopic swallowing examination. c. Results: There were significant differences between aspirators and control group in both ILC and LCD. However, no significant differences between aspirators and non-aspirators were observed in LCD, but significant difference in ILC. d. Discussion and Conclusion: Both delayed ILC and reduced LCD is able to position patients post-stroke in higher risk of aspiration. Temporal measurements of laryngeal closure help recommend the prognosis and execute swallowing treatment strategies for patients with the specific physiological impairments.

Methods

• 30 Older Subjects: 10 stroke patients who aspirate before and during the swallow (aspirators), 10 stroke patients who don’t aspirate (non-aspirators), 10 control subjects.
• Videofluoroscopic swallowing examinations (VFSE) were recorded and digitized
• 100 ms video-timer was used for slow motion, frame-by-frame analysis
• Lateral view of oral and pharyngeal structures
• 5 and 10 ml thin liquid bolus were swallowed to measure ILC and LCD and determine the presence or absence of aspiration

Initiation of Laryngeal Closure (ILC):
Significant difference among three groups (p<0.05)

Laryngeal Closure Duration (LCD):
Significant difference between stroke patients and control group (p<0.05)

A. bolus passing the ramus of mandible, B. Initial contact of epiglottis and arytenoids, C. Final contact of epiglottis and arytenoids

• ILC=B-A, LCD=C-B

Statistical Analysis

To compare ILC and LCD among aspirators, non-aspirators and control group, two-way analysis of variance (ANOVA) with post-hoc (Turkey) was performed with p<0.05 for each measurement.

Clinical Implication

• Aspirators had longest delay to initiate laryngeal closure during pharyngeal swallowing.
• Stroke patient groups has shorter laryngeal closure duration than control group.
• Reduced laryngeal closure in concurrence with delayed laryngeal closure will position stroke patients in higher risk of aspiration.
• ILC and LCD is a important tool to determine the physiological impairments of pharyngeal swallowing.
• Dysphagia rehabilitation exercises and compensatory strategies should focus on the specific physiological impairments for the patients with delayed and reduced laryngeal closure.

References
