



Fluoroscopic Study of Glossopharyngeal Insufflation and Exsufflation



Sun S¹, Jacobson F², Braver JM², Lindholm P³, Ferrigno M¹

¹Dept of Anesthesiology and ²Dept of Radiology, Brigham and Women's Hospital, Harvard Medical School, Boston, MA and
³Swedish Defence Research Agency, Centre for Environmental Physiology, Karolinska Institutet, Stockholm, Sweden

Abstract

FLUOROSCOPIC STUDY OF GLOSSOPHARYNGEAL INSUFFLATION AND EXSUFFLATION

Sun S1, Jacobson F2, Braver JM2, Lindholm P3, Ferrigno M1

1Dept. of Anesthesiology and 2Dept. of Radiology, Brigham and Women's Hospital, Harvard Medical School, Boston, MA; 3Swedish Defence Research Agency, Centre for Environmental Physiology, Karolinska Institutet, Stockholm, Sweden

BACKGROUND: Glossopharyngeal breathing can be used to inhale air above total lung capacity (Glossopharyngeal Insufflation, GI; also known as lung packing) or to exhale air below residual volume (Glossopharyngeal Exsufflation, GE). GI maneuvers are employed by competitive breath-hold divers to increase both diving depth and duration: a larger initial lung volume (achieved with GI before a dive) increases both oxygen stores and the depth at which dangerous compression of the chest occurs. Instead, GE is used to draw air from compressed lungs into the pharynx, for pressure equalization in the middle ear at depth. GI was studied in post-polio patients with cineradiography (1), but no fluoroscopic images of the diaphragm were obtained and no fluoro study of GE has ever been done.

MATERIALS AND METHODS: Fluoroscopy was used for video swallow assessment of anatomy and function of the pharynx, and for assessment of diaphragmatic motion during both GI and GE maneuvers performed by 4 competitive breath-hold divers (1 female and 3 males). Video swallow was performed with and without barium contrast.

RESULTS: Fluoroscopy revealed lateral pharyngeal pouches in 1 of the divers, similar to those seen in long-time trumpet players. Both GI and GE maneuvers resulted in simulation of ingestion in the oropharyngeal region and detailed fluoroscopic documentation will be provided at the meeting. During GI, marked hypermotility of the diaphragm was demonstrated, with its progressive flattening and eventual inversion. Flat, inverted diaphragms are typically seen in patients with COPD.

CONCLUSIONS: This is the first fluoroscopic study GE maneuvers and of diaphragmatic motion during GI. Pharyngeal pouches and inversion of the diaphragm can result from GI.

References: 1. Ardran et al. Br J Radiol 1959; 32: 322-8.

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Materials and Methods

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Results

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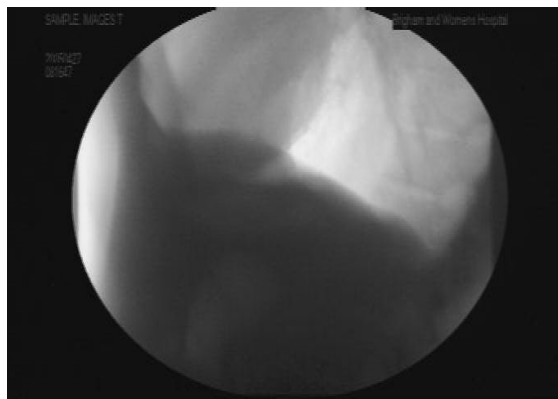


Fig. 1. This fluoroscopic image shows extreme flattening of the diaphragm during glossopharyngeal inhalation in one of our subjects.



Fig. 2. Pronounced elevation of the diaphragm is shown here during glossopharyngeal exhalation in another subject..

Conclusions

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