

Respiratory-Swallow Phase Patterns and Swallowing Impairment in Head and Neck Cancer

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INTRODUCTION

Optimal respiratory-swallow phase patterns (swallowing during exhalation at mid-to-low lung volume) are theorized to provide mechanistic advantage for safe swallow and airway protection [1]. Non-optimal respiratory-swallow coordination have been linked to increased risk of aspiration and swallowing impairment in oropharyngeal head and neck cancer (OPHNC) patients [2].

PURPOSE: The aim of this investigation was to determine the link between frequency of *optimal* respiratory-swallow phase pattern, swallowing impairment, and airway invasion in HNC patients.

HYPOTHESIS: Patients with increased non-optimal respiratory-swallow phase patterns will exhibit worse swallowing impairment and airway invasion.

METHODS

Heterogeneous group of HNC patients (49) referred for a Modified Barium Swallow Study (MBSS)

PROCEDURE:

- Synchronized videofluoroscopic and respiratory recording.
- MBSImP [™], a standardized and validated protocol for the execution,assessment and interpretation of an MBSS [3].
- Respiratory kinematics (Ribcage RC) and (Abdomen AB) and nasal airflow recorded and analyzed using (Inductotrace Ambulatory Monitoring Inc, Ardsley NY; Biopac Systems, Inc.®).
- RC/AB sum (2 RC:1 AB) and nasal airflow signals were used to detect respiratory phase and lung volume at swallow initiation (LVSI) [4] (Figure 1).

OUTCOME MEASURES:

- Percentage of swallows initiated during expiration
- Percentage of swallows initiated at mid-to-low lung volume
- MBSImP Oral (OT) and Pharyngeal Total (PT) scores
- Penetration-Aspiration Scale (PAS max) scores[5]

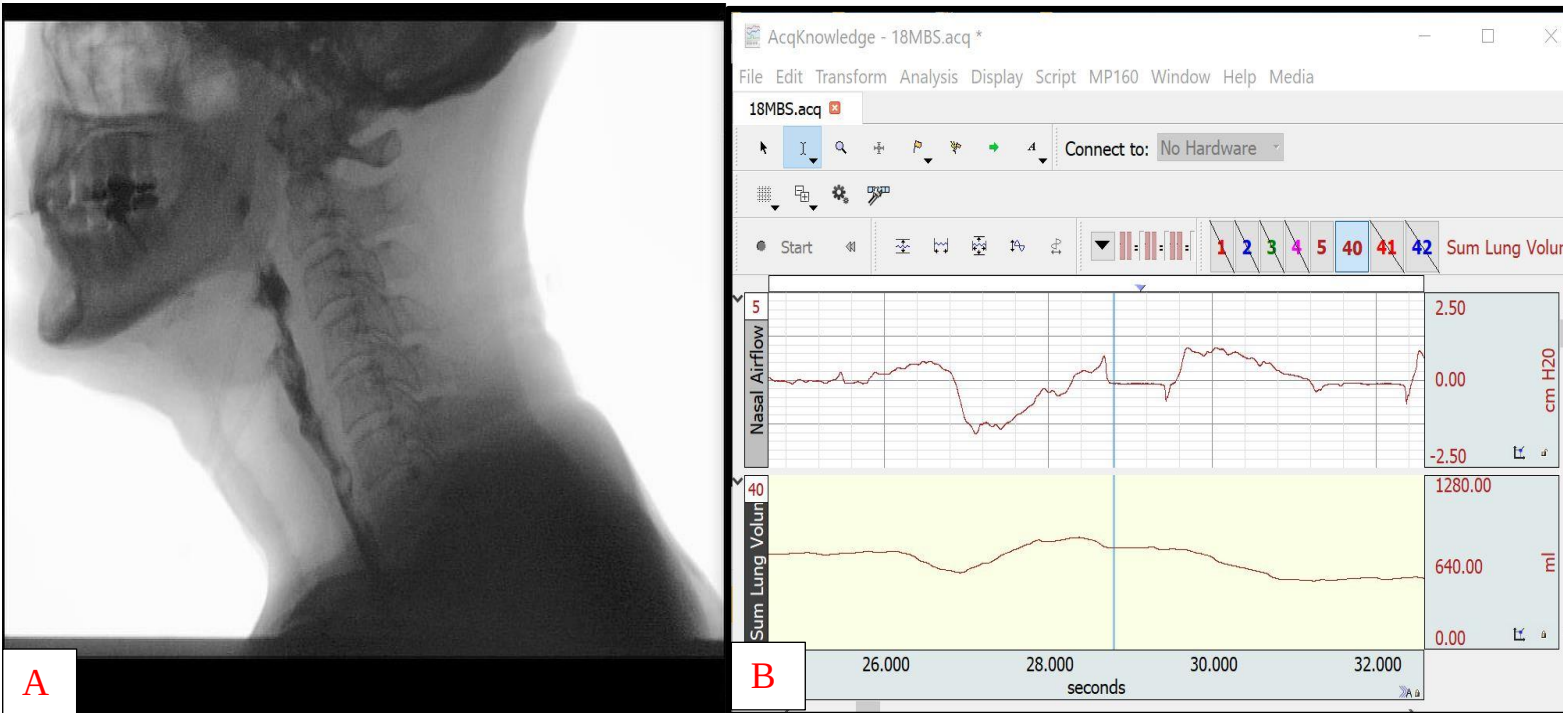


Figure 1: A. Synchronized video fluoroscopic, B. nasal airflow and RC/AB sum signal.

RESULTS

Patient sample: Pre-cancer treatment (20), Post-cancer treatment (29)
Tumor sites: oral (13), oropharyngeal (26), nasopharyngeal (3), supraglottic (1), laryngeal (1), multisite (5)

1. <i>Optimal</i> respiratory phase and Pharyngeal Total (PT) Score_(MBSImP)	
Pearson's Correlation	-.528
df	47
p value	<.0001
95% CI	-0.71 to -0.29
2. <i>Optimal</i> respiratory phase and Penetration-Aspiration Scale (PAS) Score	
Pearson's Correlation	-.555
df	47
p value	<.0001
95% CI	-0.721 to -0.32

As percentage of optimal pattern decreased, swallowing impairment (PT) and airway invasion (PAS) increased.

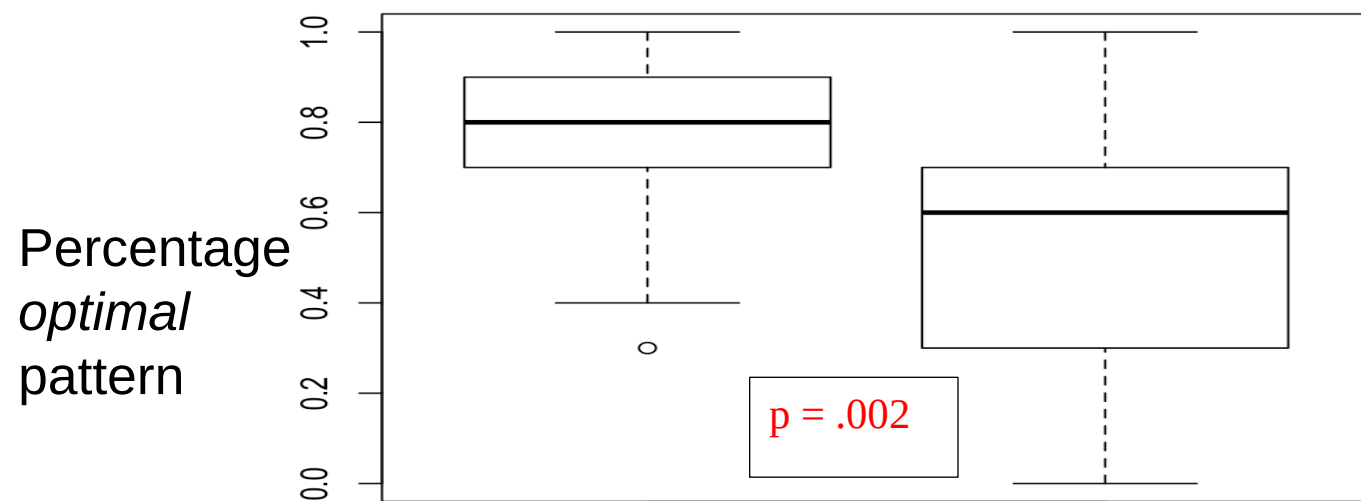


Figure 2: Patients with the highest percentages of non-optimal pattern had the greatest degrees of swallowing impairment (MBSImP PT>8)

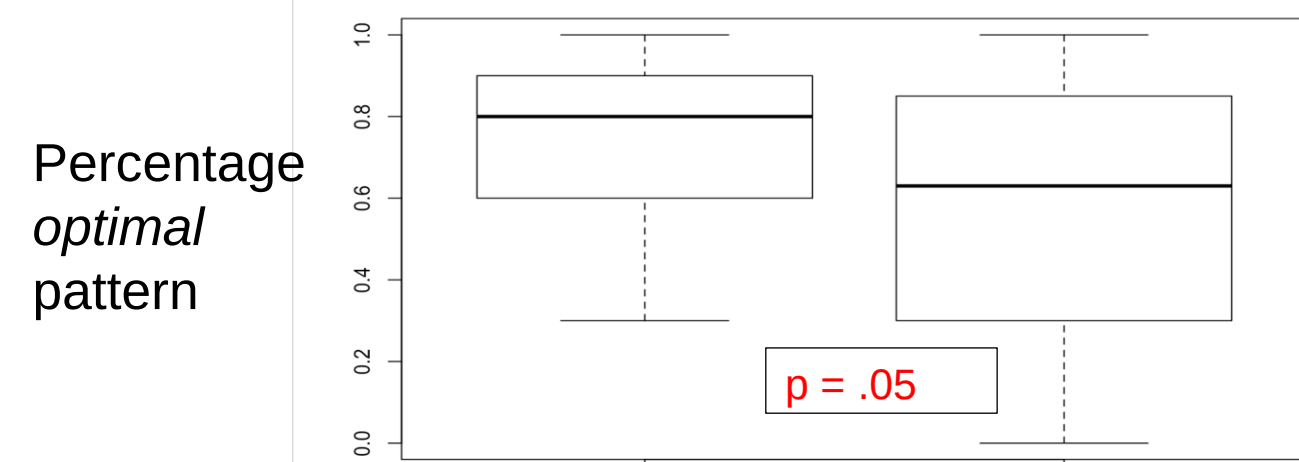


Figure 3: Swallowing impairment and non-optimal respiratory pattern were greater post-cancer compared to pre-cancer treatment
Cancer treatment: Combined Surgery (S)/Chemotherapy (C), Radiation (RT) (9), S/R (8), C/R (8), S/C (2), S (1), RT (1)

CONCLUSION:

Results support the relevance of aberrant respiratory-swallow patterning on swallowing impairment and airway invasion in patients treated for cancers of the head and neck. Findings also support ongoing investigations that show retraining an optimal respiratory-swallowing pattern improves swallowing physiology and penetration/aspiration.

SELECTED REFERENCES

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