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# Maxillofacial Prosthodontics and Speech-Language Pathologist Collaboration for Improved Speech and Swallowing Outcomes

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26 October 2023  
0910-1010 ET





## Presenters



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## Air Force Lt. Col. Hannah E. Colburn, D.M.D., M.S., F.A.C.P.



Air Force Lt. Col. Colburn is a board-certified Prosthodontist who specializes in Maxillofacial Prosthetics. She received her Doctor of Dental Medicine from A.T. Still University, Arizona School of Dentistry and Oral Health. She obtained a certificate in Public Health from A.T. Still University School of Health Management. She completed a one-year Advanced Education in General Dentistry Residency at Langley Air Force Base, Virginia. After receiving her Master of Science degree in Prosthodontics at the University of Texas Health Science Center, and her specialty training in Prosthodontics from Wilford Hall Medical Center, she completed her fellowship in Maxillofacial Prosthetics at San Antonio Military Medical Center and the Air Force Postgraduate Dental School, Joint Base San Antonio-Lackland, Texas.

Lt. Col. Colburn is the Maxillofacial Prosthodontist and the Dental Laboratory Flight Commander at Royal Air Force Lakenheath, United Kingdom. She served as the Program Director for the Air Force Maxillofacial Prosthetics Fellowship and faculty for the Air Force Postgraduate Prosthodontics Residency. She is an Assistant Professor at the Air Force Postgraduate Dental School, Uniform Services University of the Health Sciences, Joint Base San Antonio-Lackland.



## Ashley M. Logan, S.L.P.D., C.C.C.-S.L.P., B.C.S.-S., C.L.T.



Prior to relocating to Travis Air Force Base in July 2023, Dr. Logan was a speech language pathologist (SLP) within the Department of Otolaryngology – Head and Neck Surgery at Brooke Army Medical Center, a level 1 trauma center.

Dr. Logan is a swallow, voice, and airway specialist with board certification in swallowing and swallowing disorders. In addition to her clinical role, she was the San Antonio Military Health System product line lead for SLP and co-lead SLP for the Defense Health Agency.

Dr. Logan has been adjunct faculty at two accredited graduate programs in the San Antonio area teaching three courses in the aspects of medical SLP to include head and neck cancer, total laryngectomy, and critical care SLP services. She has spoken locally, at the state level, and nationally on her research in dysphagia.



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- Lt. Col. Colburn and Dr. Logan have no relevant financial or non-financial relationships to disclose relating to the content of this activity.
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# Learning Objectives



At the end of this presentation, participants will be able to:

1. Review roles of Speech language pathologists (SLP) and Maxillofacial Prosthodontics in rehabilitation efforts.
2. Explore oral appliances and impact on speech and swallow function.
3. Discuss various diagnostic procedures and benefits for evaluation and modification or oral appliances.



# SLP Targets



- Speech
  - Improved precision of articulation
- Voice
  - Improved resonance
  - Reduced nasal emission
  - Improved projection
- Swallow
  - Improved approximation of oral structures
  - Improved valve closure
  - Improved intrabolus pressure generation





# SLP Collaboration with Maxillofacial Prosthodontics



- Oral appliances
  - Speech bulbs
    - Not just for speech!
  - Palatal augmentation
    - Lifts, drops, etc
  - Customized dentures
- Intra-oral manual therapy to flap
  - Supports reduced tissue bulk/lymphedema
  - Implants, appliances, etc
- Burn patients
  - Compression
  - Oral appliances
  - Neck and facial stretching support



# Speech Bulbs



- Improvements to speech
  - Resonance, reduced nasal emission, increased clarity with articulation
- Improvements to swallow
  - Valving at the velum: reduced nasal regurgitation
  - Pressure generation: improved clearance through pharynx
- How we do it:
  - Created in maxillofacial prosthodontic clinic
  - Patient, team, equipment brought to SLP clinic
  - SLP completes nasal endoscopy and assesses speech/swallow
  - Custom fitting with temporary material until best outcome achieved
  - Maxillofacial Prosthodontics team finalizes



# Palatal Appliances

- Improvements to speech
  - Improved precision/clarity of articulation
  - Controlled airflow for fricatives
- Improvements for swallow
  - Oral pressure generation
  - Bolus control
  - Lingual to palate contact for oral residuals

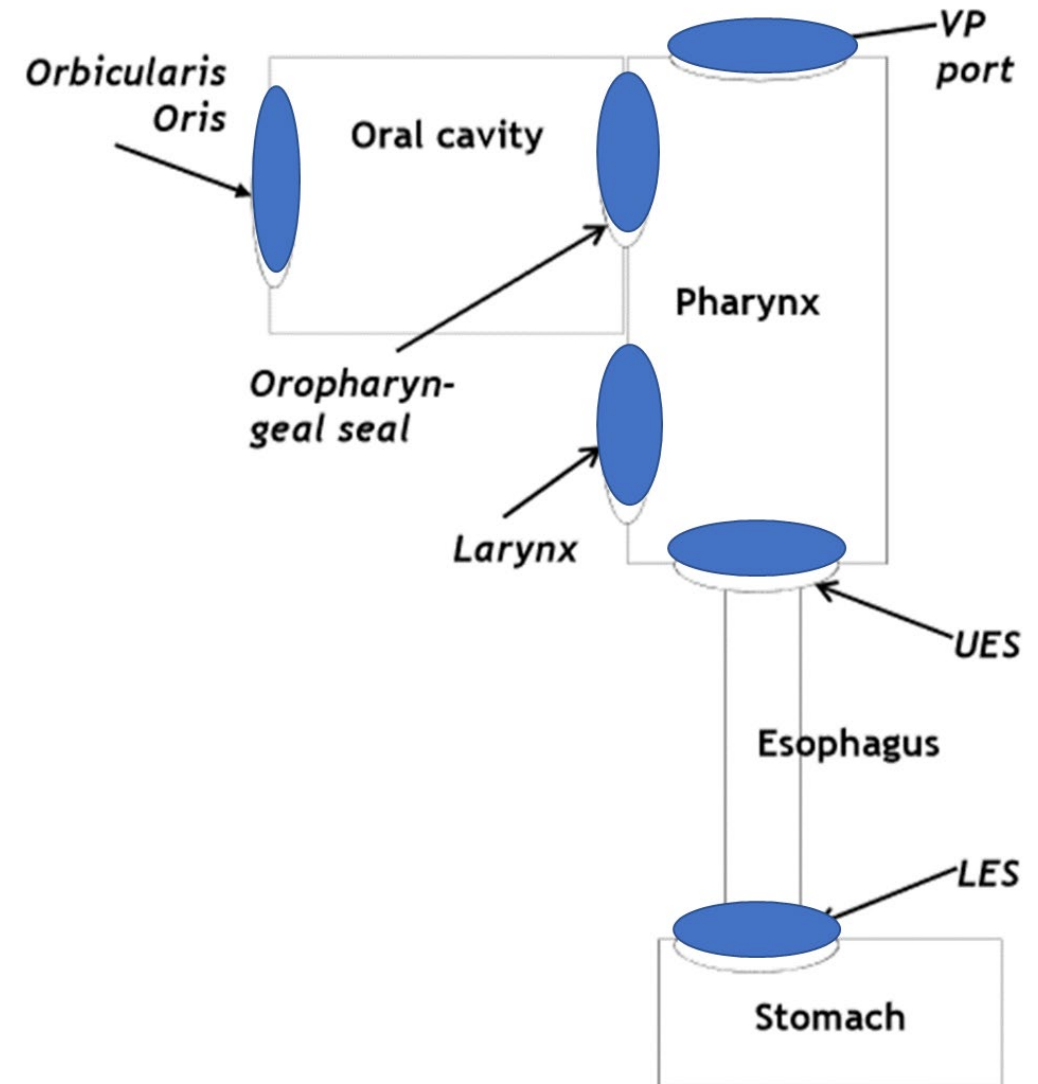


Image Abbreviations:

Velopharyngeal (VP) port

Upper Esophageal Sphincter (UES)

Lower Esophageal Sphincter (LES)



# Patient 1: Voice and Swallow Complaints



- 83 y/o female with past medical history of hard palate (serum squamous cell carcinoma antigen) squamous cell carcinoma (SCCa) s/p resection and radiation therapy (RT) presented with late-radiation associated dysphagia secondary to fibrosis
  - Modified diet to International Dysphagia Diet Standardization Initiative (IDDSI) 5 Minced and Moist & IDDSI 1 Thin liquids (complicated by denture fit)
- SLP
  - Diagnostics: videofluoroscopy, endoscopy, laryngovideoscopy
  - Limited role for therapy
    - Current data supports attempting intervention but outcomes poor in late radiation-associated dysphagia (late-RAD) (Hutcheson et al., 2012; Hutcheson, 2013)
  - Emphasis on compensation to target functional goal of eating cake at granddaughter's wedding in six months
  - Impairment: oropharyngeal dysphagia
  - Goals
    - Improve mastication, bolus formation, and clearance
    - Reduce (silent) aspiration
- Maxillofacial Prosthodontics
  - Custom obturator/denture
  - Addition of speech bulb to denture (Bohle III et al., 2005; Kallambettu et al., 2022; Mantri et al., 2012; Shin et al., 2015)



# Patient 1: Swallow Video



**Video removed from handouts for file size purposes:**

Video: X-ray of a patient's lower jaw and neck while swallowing.



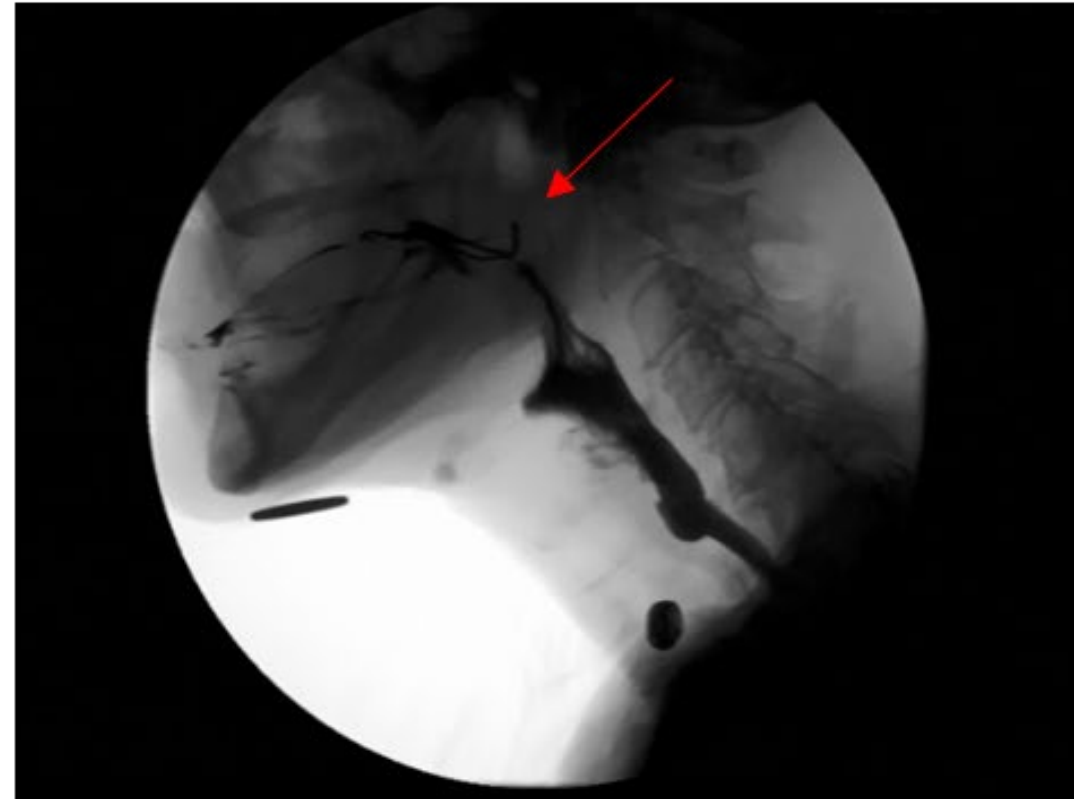
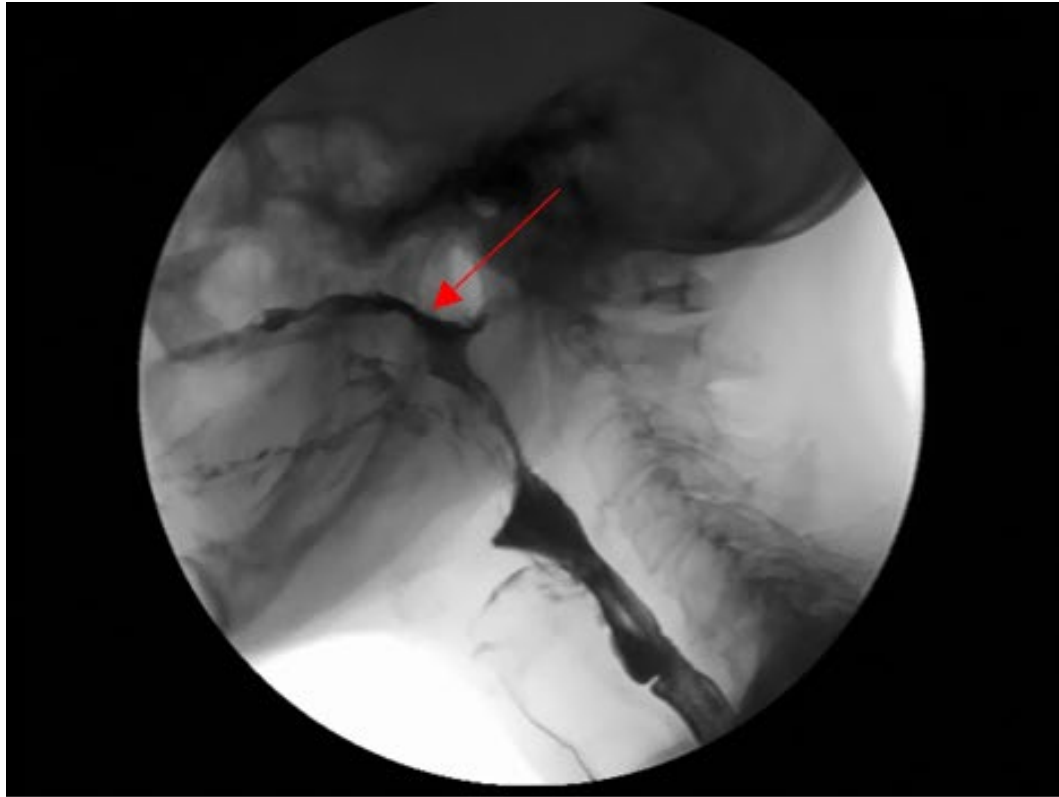
# Patient 1: Speech Video



# Patient 1: Speech Stills



# Patient 1: Swallow Stills







## Patient 2: Voice and Swallow Complaints



- 60 year old male status post (s/p) resection, reconstruction and chemoradiotherapy (CRT) for head and neck cancer (HNC) with significant fibrosis
- Complaints of nasal emission during speech hindering clarity at work
- Swallow complaints consistent – liquid tolerance but difficulty with dense textures due to fibrosis
  
- SLP
  - Diagnostics: videofluoroscopy, endoscopy, laryngovideoscopy
  - Limited role for therapy
    - Current data supports attempting intervention but outcomes poor in late-RAD (Hutcheson et al., 2012; Hutcheson, 2013)
  - Impairment: dysphonia, imprecise articulation, oropharyngeal dysphagia, pharyngoesophageal dysphagia
  - Goals
    - Improve projection for use of two-way radio
    - Reduce nasal emission
    - Reduce (silent) aspiration
  
- Maxillofacial Prosthodontics
  - Speech bulb (Bohle III et al., 2005; Kallambettu et al., 2022; Mantri et al., 2012; Shin et al., 2015)





# Patient 2: Speech Video

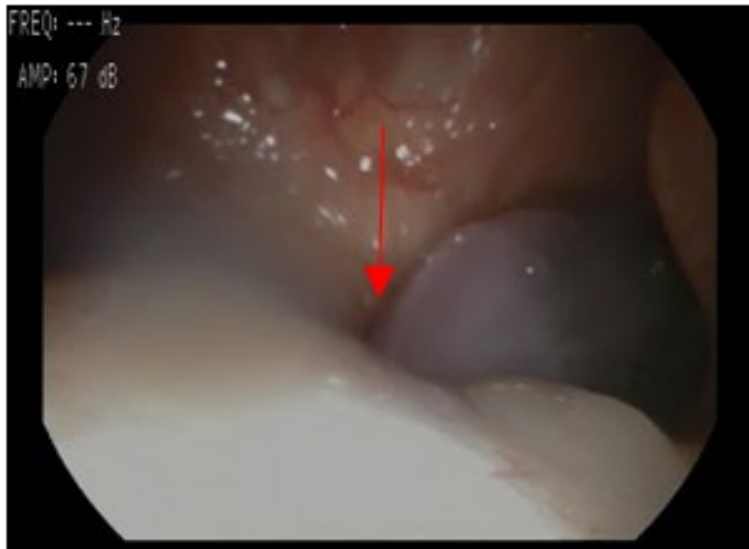
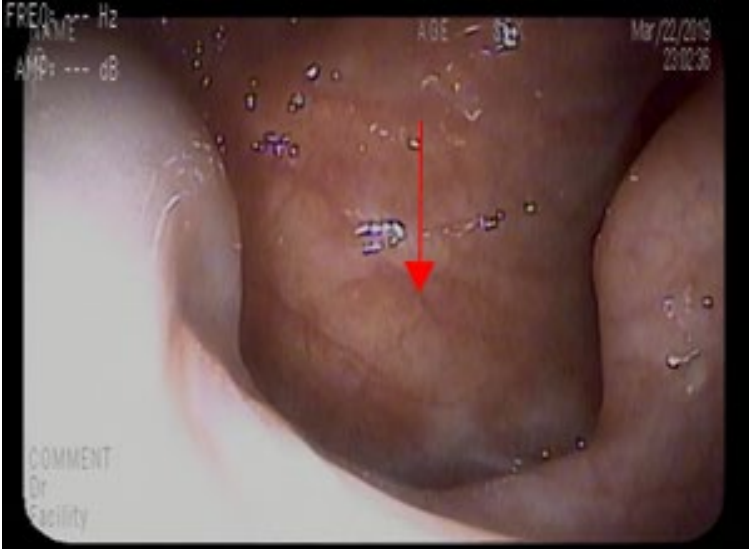




# Patient 2: Post-Edits

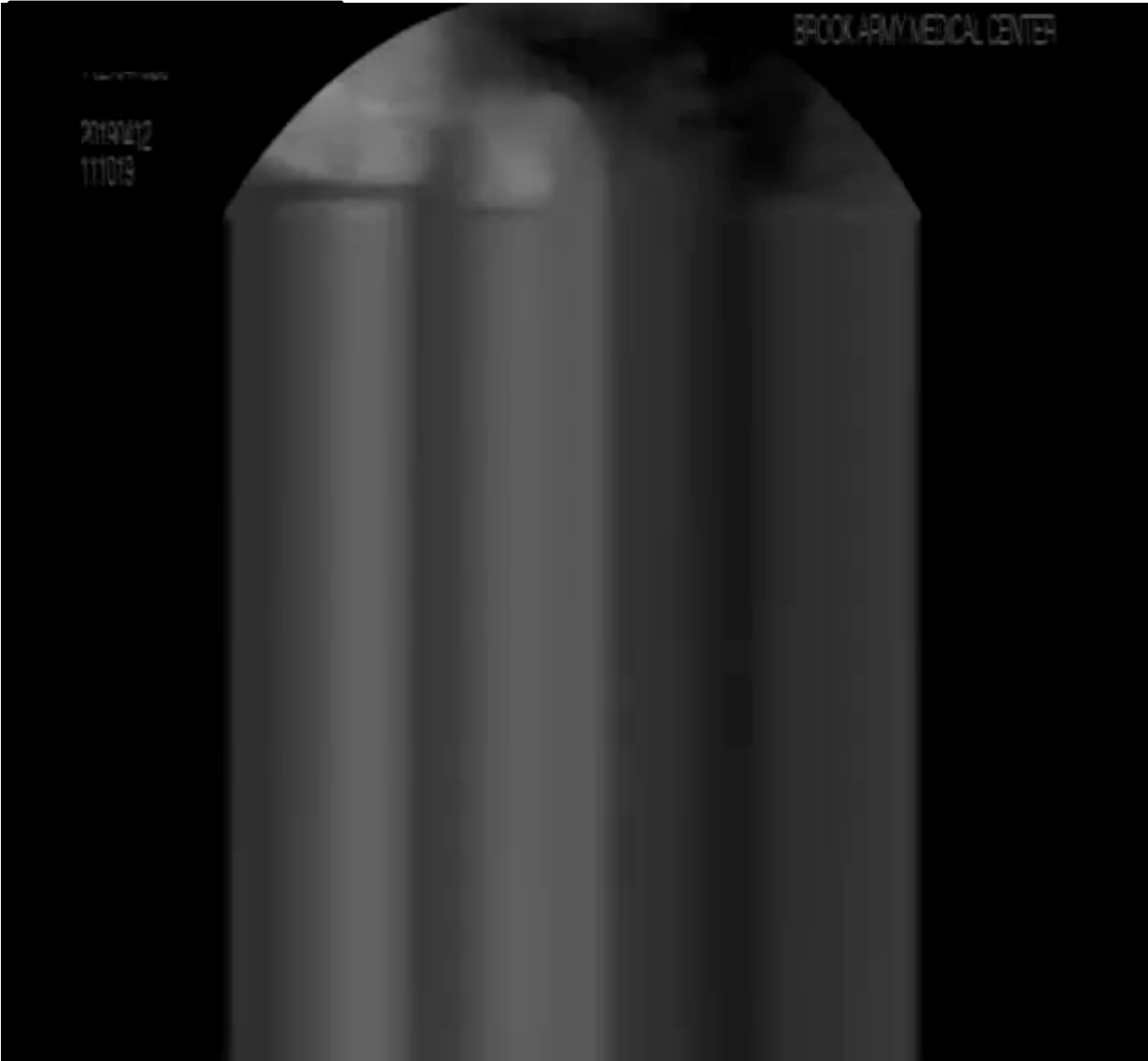


# Patient 2: Speech Stills



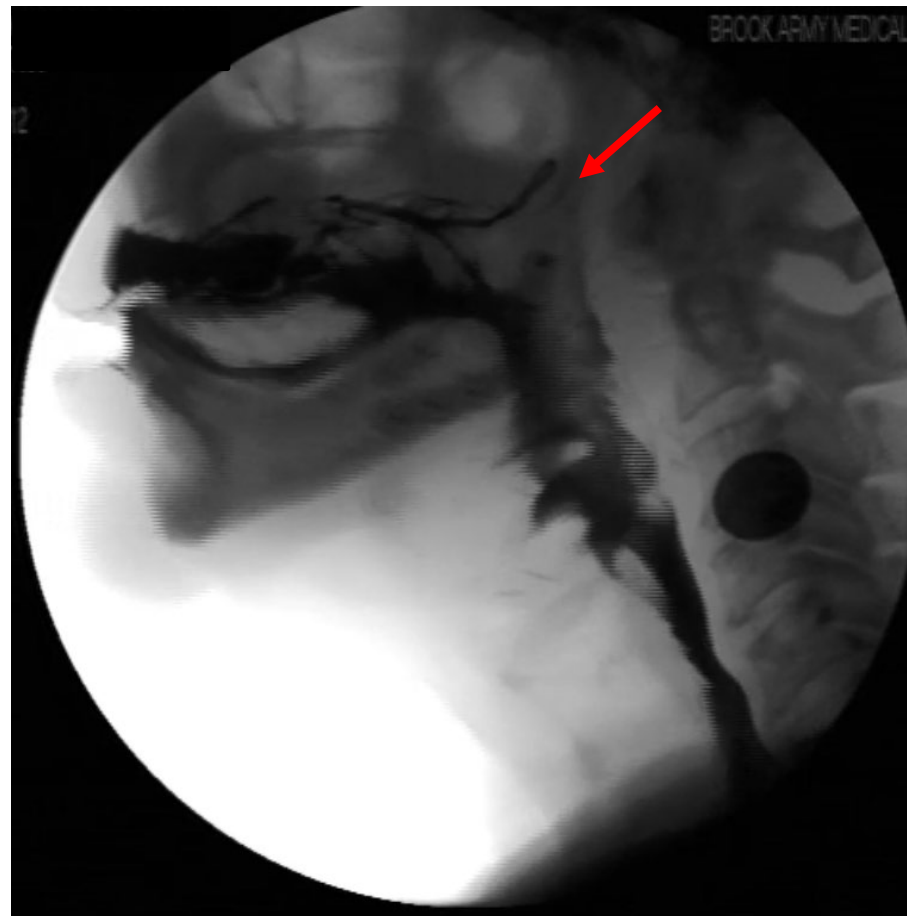
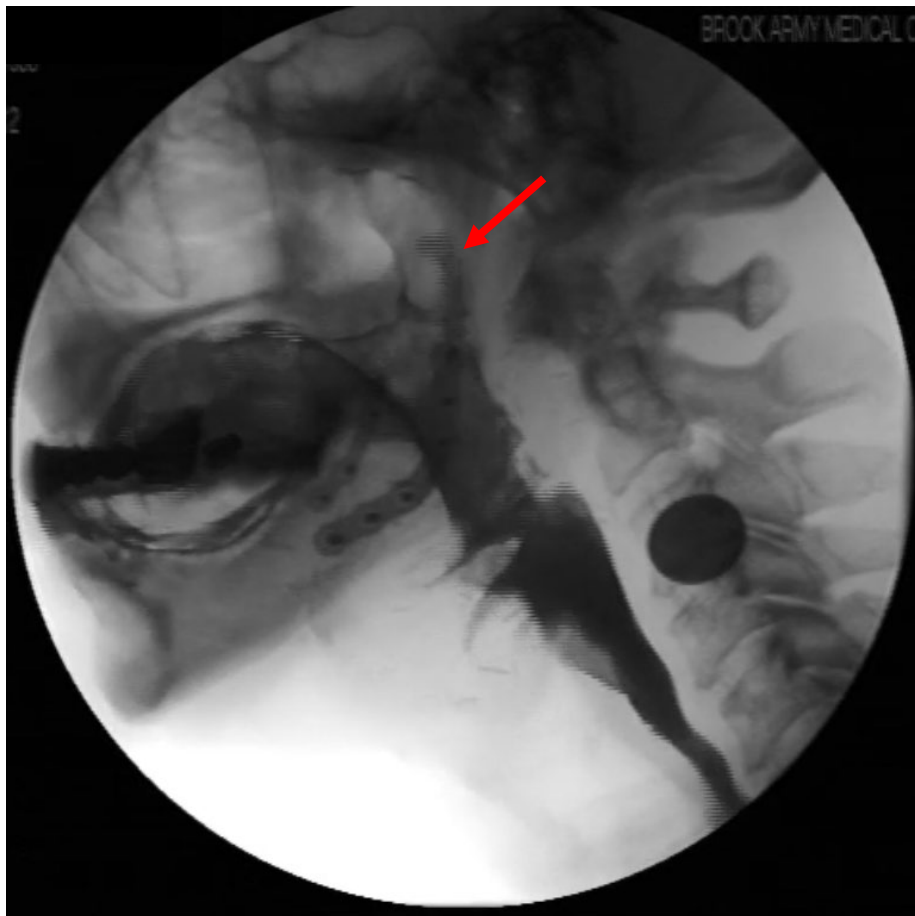


# Patient 2: Swallow Video



(Logan, 2019)

# Speech Bulb 2: Swallow Stills





## Patient 3: Voice and Swallow Complaints



- 66 year old male s/p surgical resection of L tonsillar SCCa and left radical neck dissection (LRND) with pectoral flap followed by post-op RT
- Extensive fibrosis that initially no therapist would touch
- Treatments now include physical therapy, SLP, hyperbaric, botox
- Impairments: dysphonia, oropharyngeal dysphagia, pharyngoesophageal dysphagia
- Goals:
  - Voice: improve projection and intensity
  - Swallow: improve laryngeal valve closure, improve pharyngeal clearance\*
- SLP and Laryngology
  - Diagnostics: videofluoroscopy, endoscopy, laryngovideoscopy
  - Limited role for therapy
    - Current data supports attempting intervention but outcomes poor in late-RAD (Hutcheson et al., 2012; Hutcheson, 2013)
    - Combination of injection laryngoplasty with compensatory techniques (Tirado et al., 2010; Villari & Courey, 2015)
    - Combination of esophageal dilation for bolus clearance with compensatory technique (Francis et al., 2015)
- Maxillofacial Prosthodontics
  - Speech bulb customization (Bohle III et al., 2005; Kallambettu et al., 2022; Mantri et al., 2012; Shin et al., 2015)

# Patient 3: Swallow Still

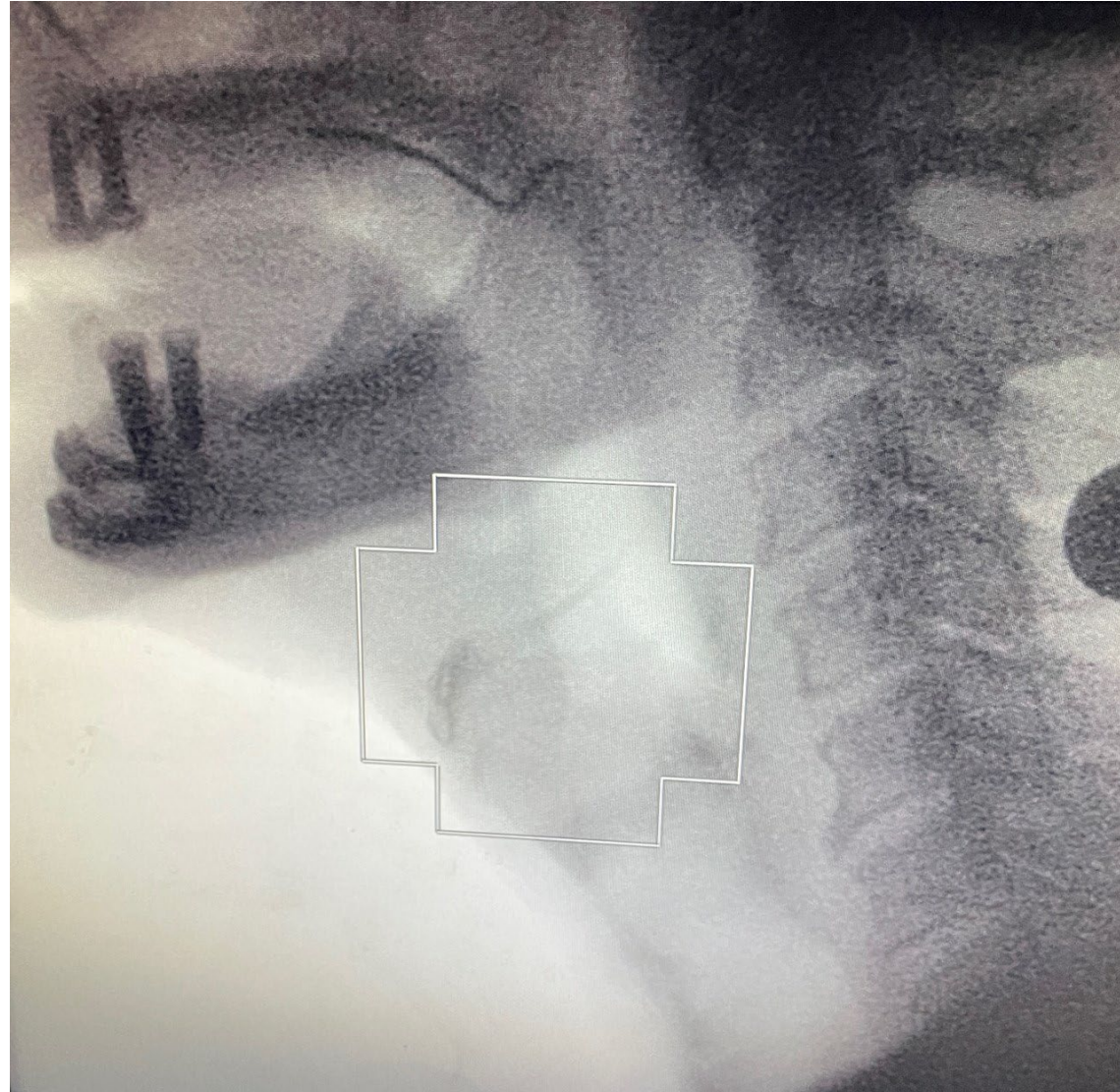




# Patient 3: Swallow Still

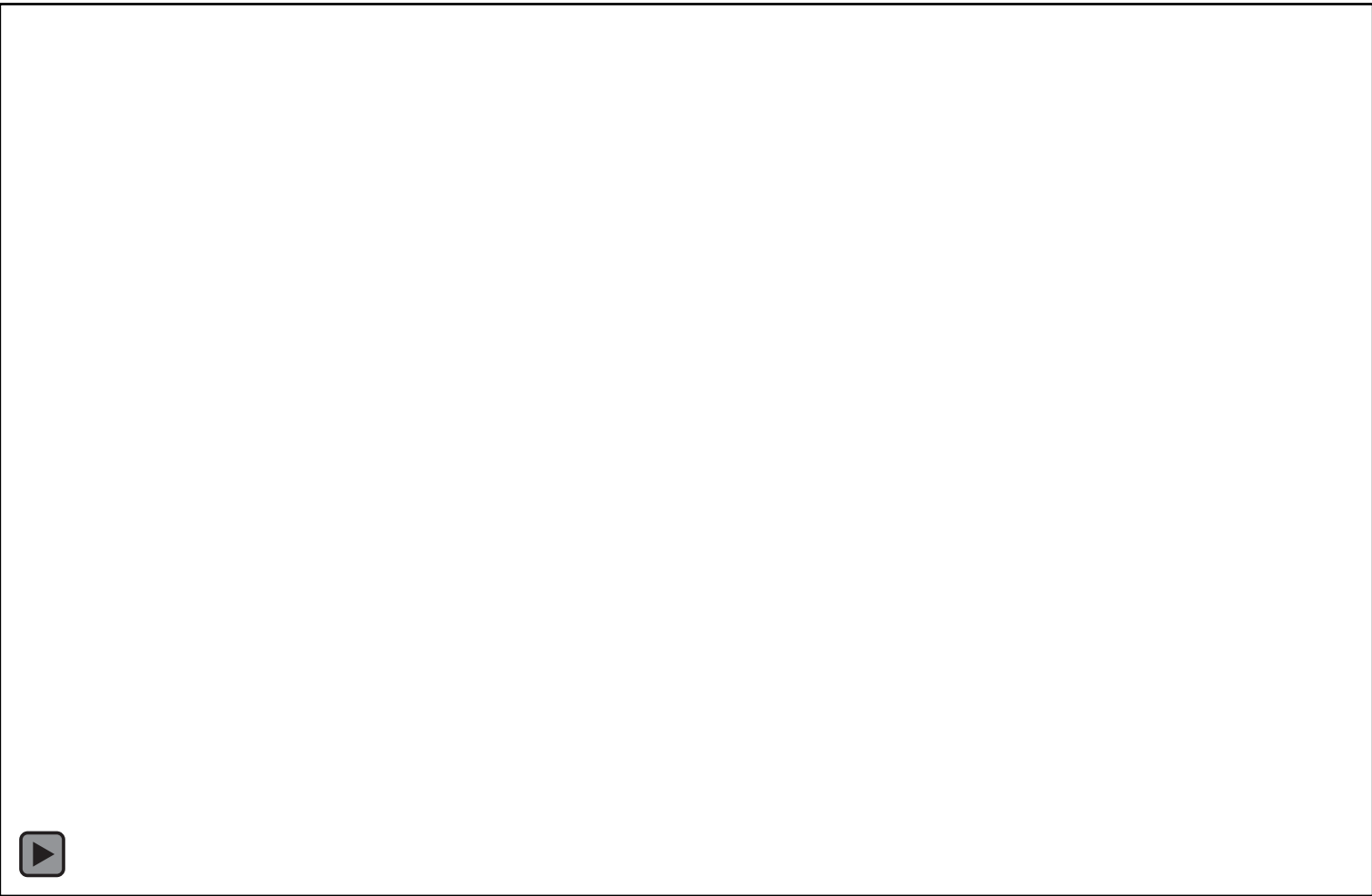


# Patient 3: Bulb Placement



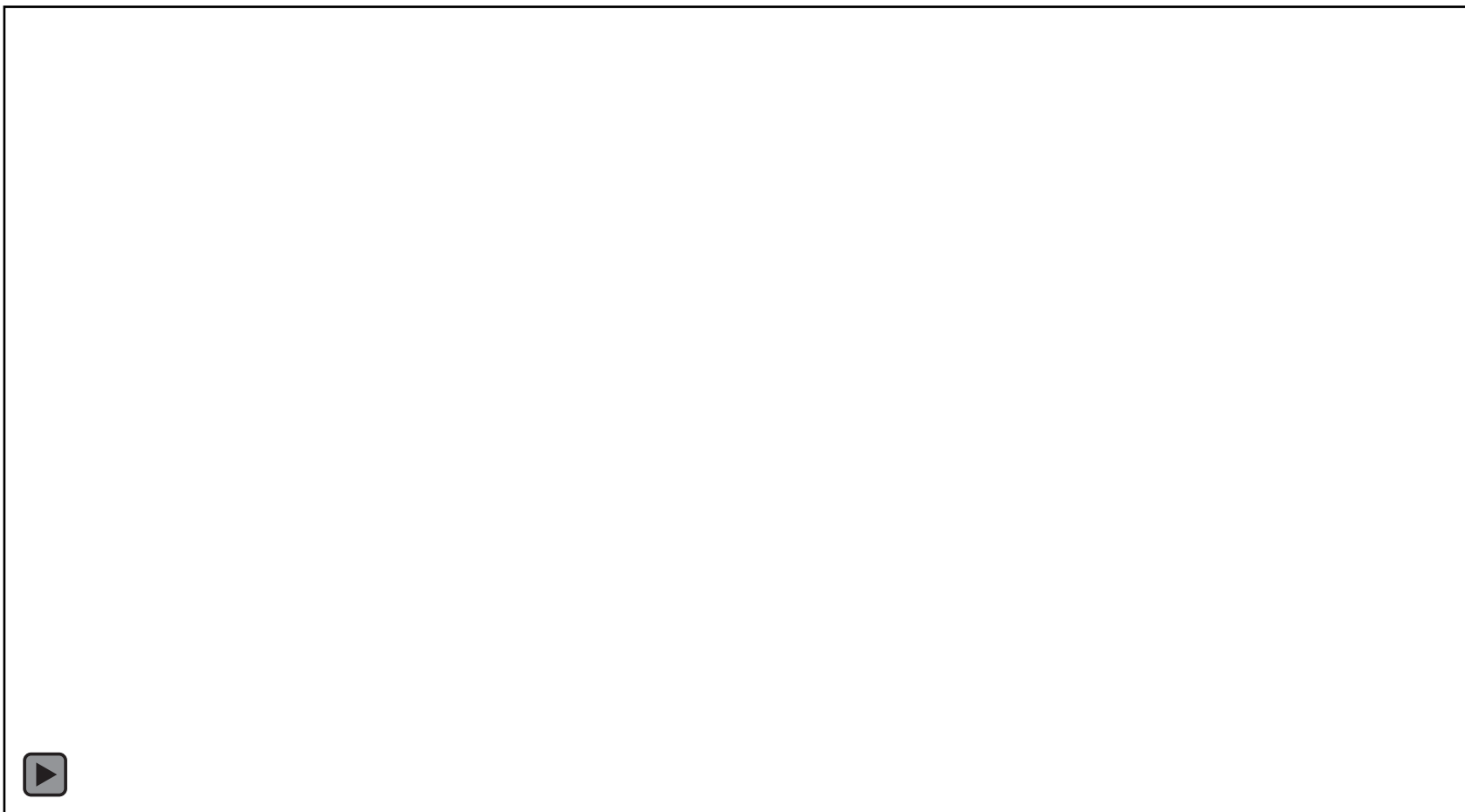


# Patient 3: Speaking Tasks- Anterior Articulation



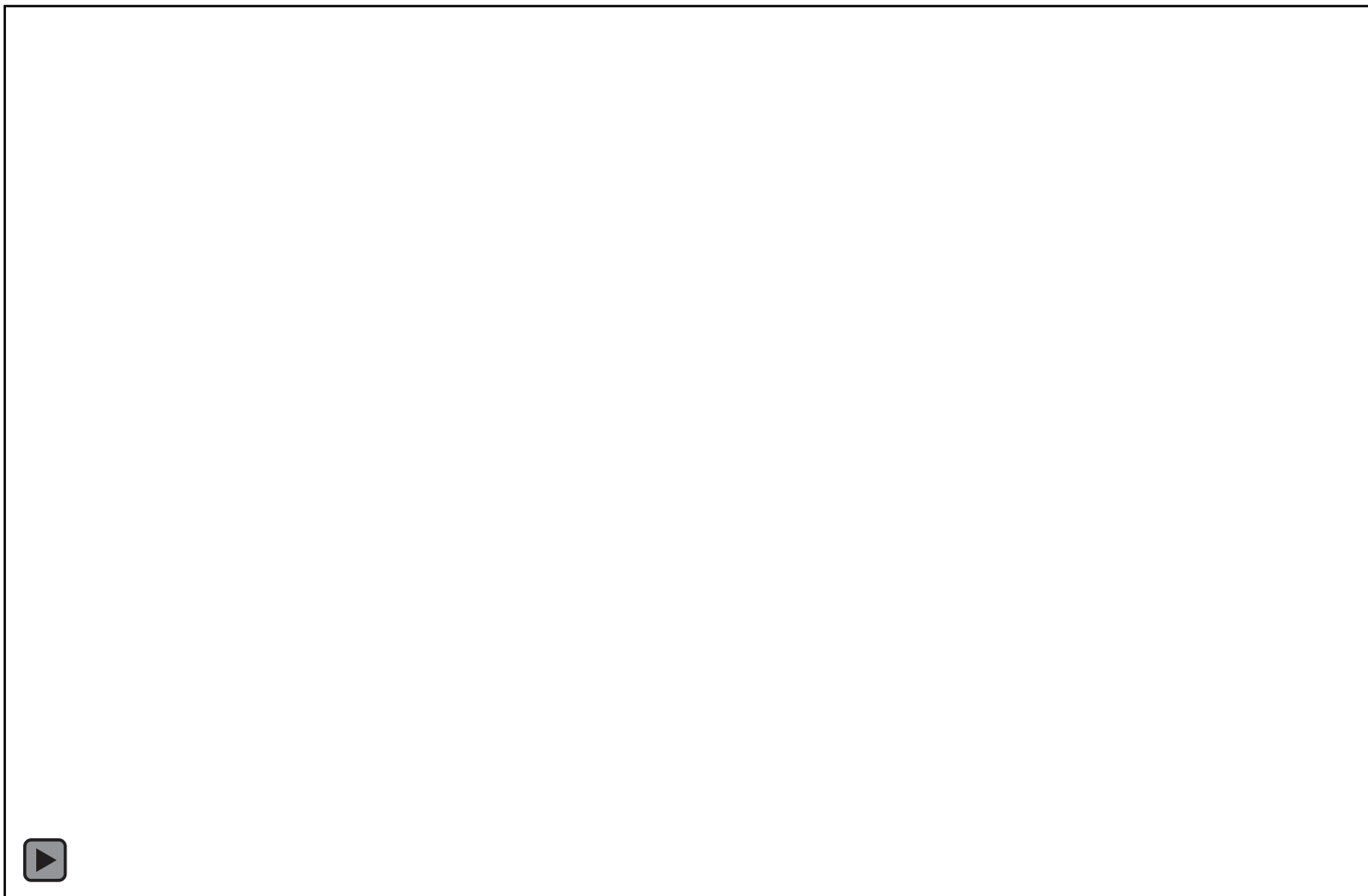


# Patient 3: Speaking Tasks- Posterior Articulation



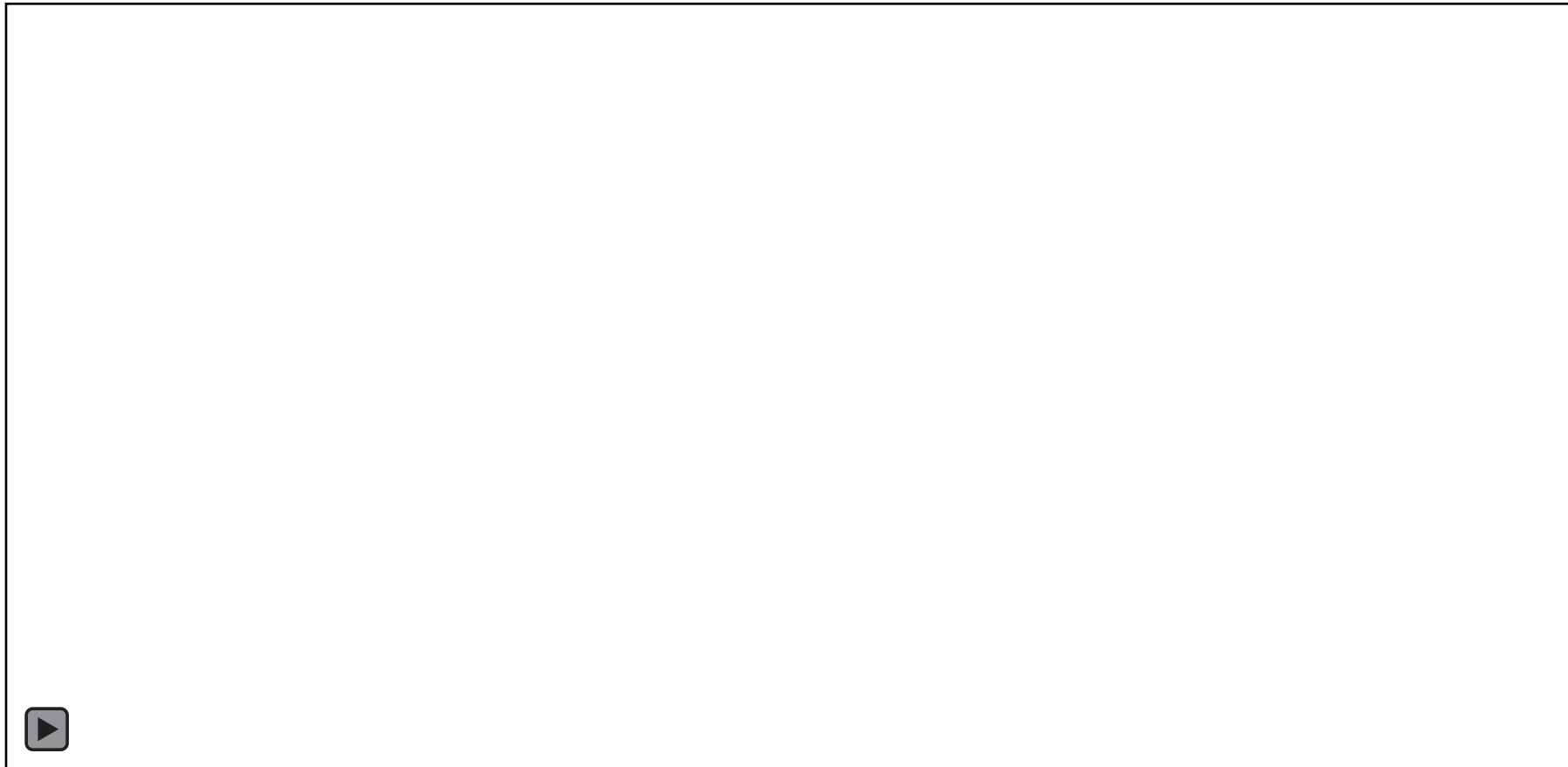


# Patient 3: Speaking Tasks- Connected Speech





# Patient 3: Speech Bulb Customization 2023

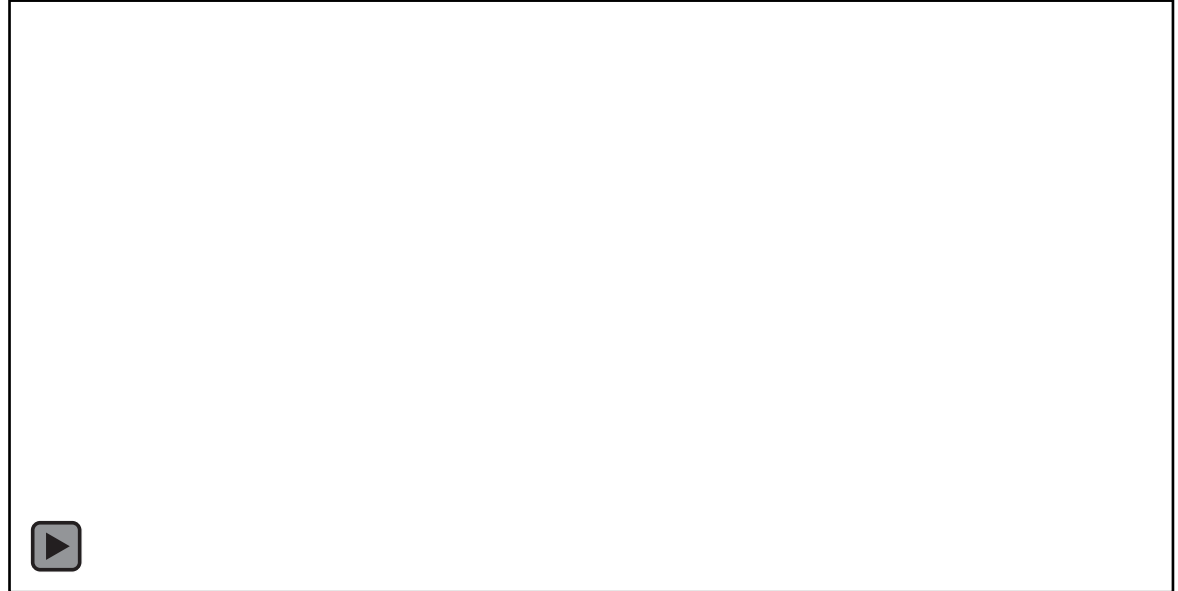


## Initial Complaint:

Not getting enough air in through the nose



# Patient 3: Modification: Narrow the Base



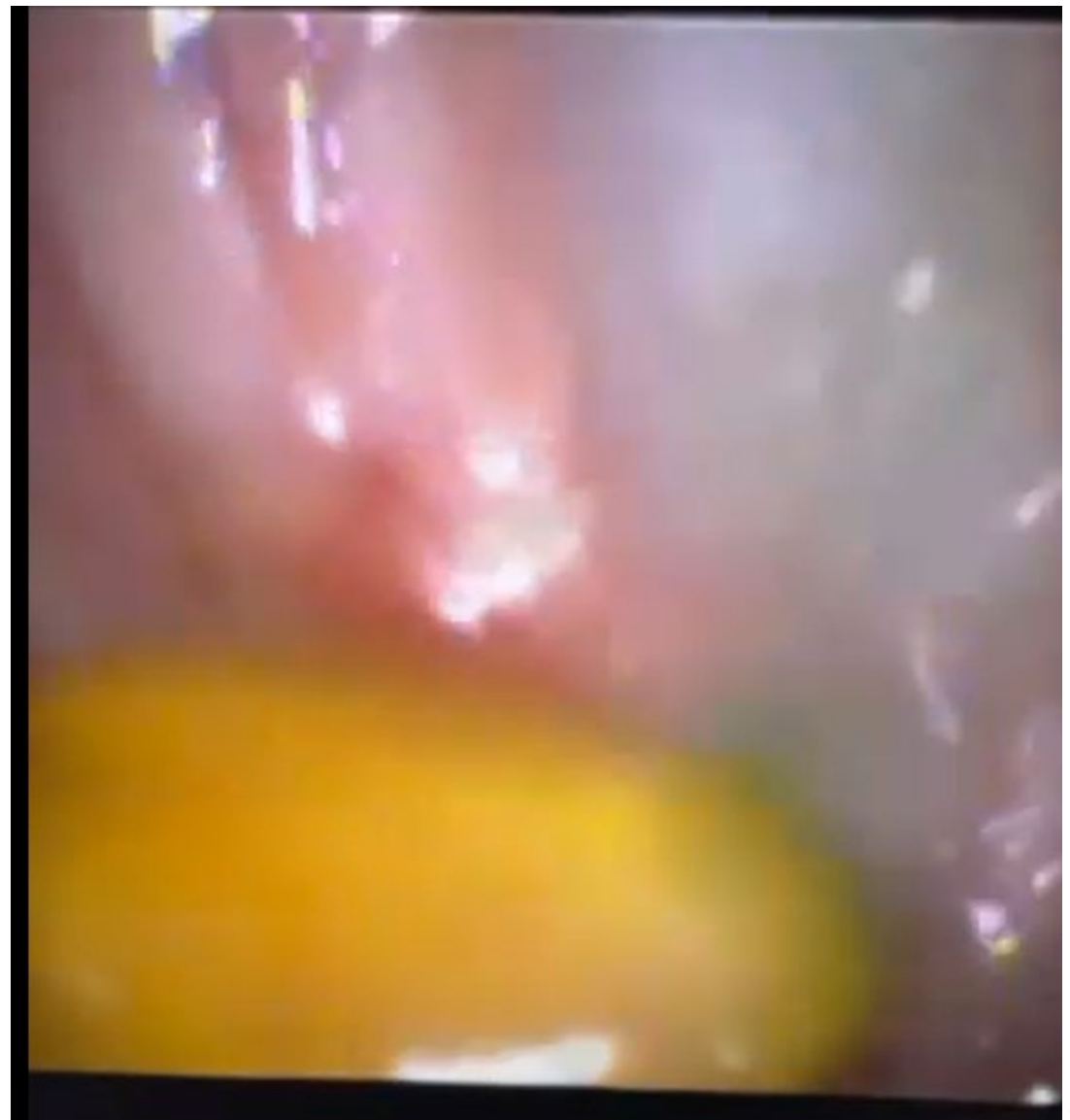




# Patient 3: Swallow Evaluation



# Patient 3: Before and After





# Intraoral and Orofacial Manual Therapy



- Manual manipulation of flap, tongue, floor of mouth, etc.
  - Lymphedema therapy
    - Promotes lymphatic drainage and reduces fluid/flap bulk
  - Manual therapy
    - Pressure, massage, myofascial techniques
    - Reduce stiffness, firmness, or tension on areas of anatomy
  - Passive/active assisted stretching
- WHO???
    - HNC
    - Burn
    - Facial nerve injury
      - Bell's Palsy
    - Facial trauma
      - Sporting accidents
      - Gun shot wound



# Burn Patients- MF Pros



- Facial compression
  - Softens scar tissues allowing for manual therapy/stretch with SLP
- Oral appliances
  - Labial stretching
    - Orange peel
    - Retractors
- Structural supports
  - Neck stretching to limit shortening of bands
  - Softens scar tissues



# Burn Patients- SLP



- 30s male jet mechanic s/p flash burn with approx. 80% total burn surface area (TBSA)
- Combination of MS Pros custom creations for stretching and manual therapy
- SLP therapy
  - Approximately 2 year -initially 3x per week
  - Staggered visits with burn plastics procedures
    - Approx. 1-2 weeks healing depending on procedure and then back to manual therapy
  - Impairment: oral phase dysphagia
  - Goals
    - Improved labial competence to reduce bolus loss and improve suction for straw use (Rumbach et al., 2011)
    - Improved maximum incised opening- jaw was mobile under facial contractures (Clayton et al., 2009; Rumbach et al., 2016)
- Maxillofacial Prosthodontics
  - (Macmillan et al., 1991)

## Patient 3: Facial Burns

**Photo removed from handouts for privacy reasons:**

An image of a patient with facial and neck burns. A gloved hand holds the front of his neck. The other gloved hand presses down on his right (photo-left) shoulder.

A red arrow points to the gloved hand that presses down against the patient's right shoulder.

A red arrow points to the fingers of the gloved hand that holds the patient's neck.

**Photo removed from handouts for privacy reasons:**

An image of a patient with facial and neck burns. Two gloved hands hold his lower jaw.

A red arrow points to the fingers of the gloved hand that holds the patient's right lower jaw.

A red arrow points to the fingers of the gloved hand that holds the patients left (photo right) lower jaw.

## Patient 3: Facial Burns

### **Photo removed from handouts for privacy reasons:**

Photo of a patient with facial and neck burns. Two gloved hands hold the patient's lower jaw and neck.

A red arrow points to the thumb of the gloved hand that holds the patient's right (photo-left) lower jaw and neck; the thumb is below the patient's lower lip.

A red arrow points to the index finger of the gloved hand that holds the patient's left (photo-right) lower jaw and neck. The index finger extends across the neck to the other gloved hand on the opposite side.





## Patient 3: Facial Burns



**Photo removed from handouts for privacy reasons:**

Profile photo of a patient with facial and neck burns. A gloved finger inserted in the mouth presses out against the patient's cheek.

**Photo removed from handouts for privacy reasons:**

Profile photo of a patient with facial and neck burns. A gloved finger inserted in the mouth presses against a gloved thumb outside the mouth.

# Patient 3: Facial Burns



## Patient 3: Facial Burns

**Photo removed from handouts for privacy reasons:**

Close up of a patient's lower face in profile. The patient has facial burns. Gloved fingers hold the patient's lower jaw.

A red arrow points to an area below the patient's lower lip.

**Photo removed from handouts for privacy reasons:**

Close up of a patient's lower face in profile. The patient has facial burns. Gloved fingers hold the patient's lower jaw.

**Photo removed from handouts for privacy reasons:**

Close up of a patient's lower face in profile. The patient has facial burns. A gloved index finger rests below the patient's lower lip.

**Photo removed from handouts for privacy reasons:**

Close up of a patient's lower face in profile. The patient has facial burns. Gloved fingers hold the patient's lower jaw.

## Patient 3: Facial Burns

**Photo removed from handouts for privacy reasons:**

Frontal photo of the lower face of a patient with facial and neck burns.

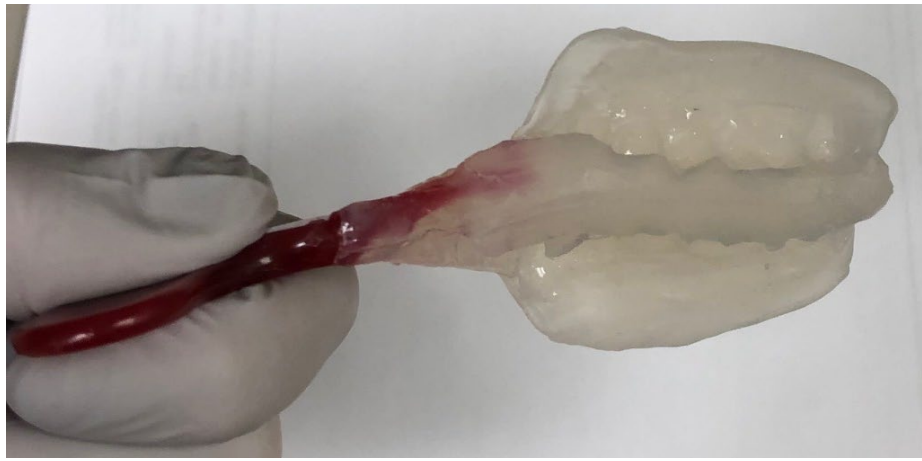
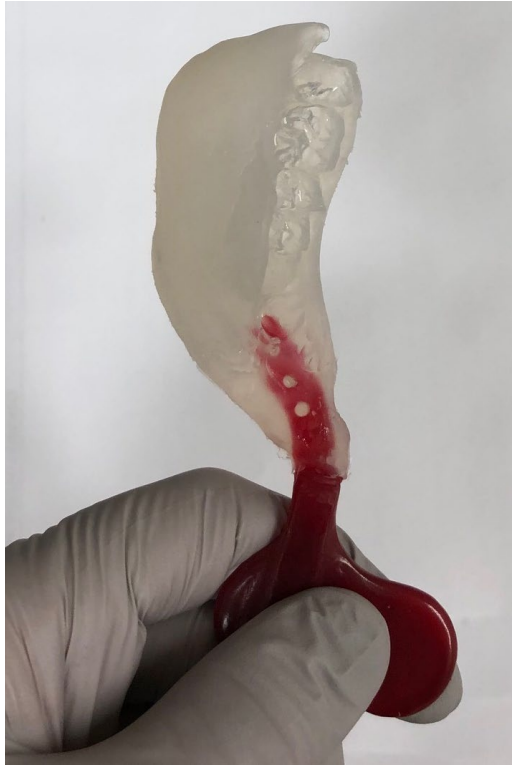
A red arrow points to the patient's chin area.

**Photo removed from handouts for privacy reasons:**

45 degree angle photo of the lower face of a patient with facial and neck burns.

A red arrow points to the patient's chin area.

# Patient 3: Facial Burns



## Patient 3: Facial Burns

**Photo removed from handouts for privacy reasons:**

The front lower face of a patient with facial and neck burns. A mold is in the patient's mouth. The lips are mainly closed.

**Photo removed from handouts for privacy reasons:**

The front lower face of a patient with facial and neck burns. A mold is in the patient's mouth. The lips are slightly ajar.

**Photo removed from handouts for privacy reasons:**

45-degree angle shot of the lower face of a patient with facial and neck burns. A mold is in the patient's mouth. The lips are slightly ajar.

A red arrow points to the patient's neck area.



# Key Takeaways

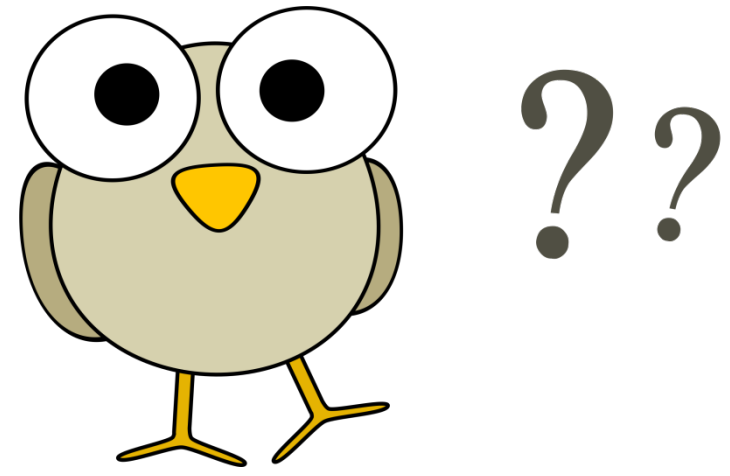


- Structure before function
- Multidisciplinary collaboration can advance progress toward goals
- Timing matters
- Intervention at any stage of injury, illness, or recovery can bring benefit even without complete resolution of symptoms





# Questions?





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