

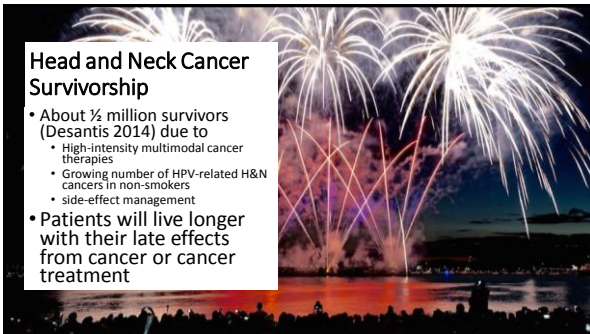
UPMC LIFE CHANGING MEDICINE

Head and Neck Cancer Multifaceted Management: A Survivorship Clinic Approach

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University of Pittsburgh Medical Center Centers for Rehab Services

Learning Objectives

- Upon completion of this course, you will be able to recognize how integration of speech language pathology and physical therapy treatment can attain greater functional success for your patients with head and neck cancer.
- Upon completion of this course, you will be able to employ a broader scope of treatment strategies in the management of patients with head and neck cancer.
- Upon completion of this course, you will be able to discuss the role of the physician, dentist, and audiologist, and their contributions to the rehabilitation of patients with head and neck cancer.



Head and Neck Cancer Survivorship

- About ½ million survivors (Desantis 2014) due to
 - High-intensity multimodal cancer therapies
 - Growing number of HPV-related H&N cancers in non-smokers
 - side-effect management
- Patients will live longer with their late effects from cancer or cancer treatment



UPMC Head and Neck Cancer Survivorship Clinic

Directors:
Jonas T. Johnson, MD
Marci Lee Nilsen, PhD, MSN, RN

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During our first year, we have had **479** visits and seen **438** unique patients.

Variables	M:SD	n (%)
Age	63.96±11.16	
Male		317 (72.4)
Race		
White		411 (93.8)
Histology		
Squamous Cell Carcinoma		395 (90.2)
Tumor Site		
Oral Cavity		121 (27.6)
Oropharynx		161 (36.8)
HPV+		122 (75.8)
Larynx		87 (19.9)
Other		69 (15.7)
AJCC Stage		
Tis-II		111 (25.3)
III-IV		281 (64.2)
Unknown/Other		46 (10.5)

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Post-treatment Survivors n=389

Variables	M:SD	n (%)
Treatment Type		
Surgery		98 (25.2)
Radiation alone		21 (5.4)
Surgery + radiation		70 (18.0)
Surgery + chemoradiation		78 (20.1)
Chemoradiation		121 (31.1)
Time since Diagnosis (years)	5.92±6.58	
Time since Treatment Completion (years)	5.67±6.59	
Additional Cancer Diagnosis		
Local recurrence		80 (20.6)
Distant Metastasis		15 (3.9)
Second Primary		27 (6.9)

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Clinic Visit: PROs

- Patient-reported outcomes (PROs) questionnaires
 - Quality of Life
 - Symptoms of depression and anxiety
 - Swallowing difficulty
 - Neck disability
 - Health Literacy
 - Oral health

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Patient-Reported Outcomes

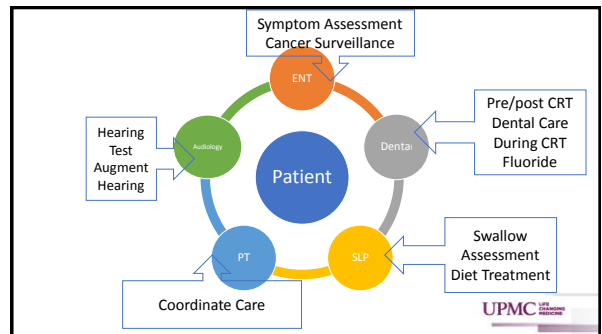
- **89.5%** (n=348) report **at least one** late and long-term effect of treatment; **54.7%** (n=213) reported **at least three**.
- The most commonly reported cancer and treatment effects were: **swallowing (49.6%), saliva (37.0%), pain (29.3%), chewing (22.4%), and speech (20.8%)**.
- **30.8%** (n=120) of patients report their quality of life is **somewhat to much worse** than it was prior to developing cancer.

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Patient-Reported Outcomes

- **45 patients (11.8%)** reported symptoms indicating **major depression** and **35 patients (9.1%)** reported symptoms of **generalized anxiety**
- **73.2%** (n=276) of patients scored ≥ 3 on the EAT-10, which may indicate that they are **not swallowing efficiently or effectively**
- **54.6%** (n=178) of patients reported **some degree of neck disability**; **19.3%** (n=63) patients reported **moderate to complete** neck disability
- **19.5%** (n=31) of patients have **inadequate health literacy**

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Speech-Language Pathology Intervention

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Department Otolaryngology, University of Pittsburgh
Medical Center

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Speech-Language Pathology Intervention

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Department Otolaryngology, University of Pittsburgh Medical
Center

Primary therapy goal...

help survivors improve quality of life

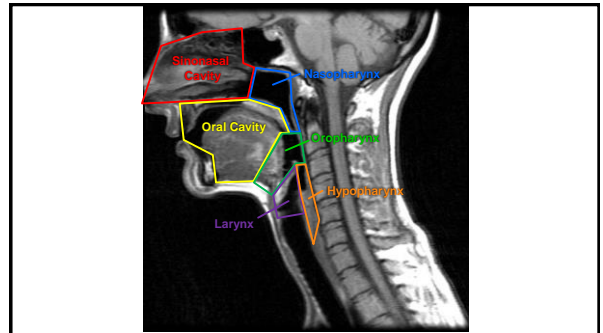
The most commonly reported cancer and treatment effects were: **swallowing (48.7%)**, **saliva (39.1%)**, **pain (29.4%)**, **chewing (23.0%)**, and **speech (21.6%)**

3 E's

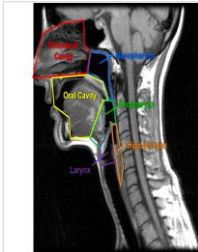
- Early Intervention
- Education
- Exercise

Maximize & Maintain Function

- Postural techniques and behavioral strategies
 - reduce/prevent aspiration
 - decrease symptoms of dysphagia (i.e. coughing, food sticking)
- Identify the food and drink consistency most appropriate (safety and function)
- Promote exercise maintenance routine for LIFE!



The Clinician's Assessment involves identifying...



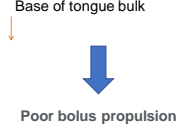
- Location of tumor
 - how does it change function?
- Size of tumor
 - T1-T4
- Type of treatment
 - Surgery, CRT, adjuvant treatment
- Previous head and neck cancer/type of treatment?

Other considerations...

- Baseline function
 - swallowing/nutrition
 - Mobility
- Co-morbidities associated with dysphagia
 - Stroke, neurological disease, COPD
- Age

Normal swallowing changes with age

- Slower transit times
- Esophageal dysmotility
- Loss of muscle mass (sarcopenia)
- Base of tongue bulk



Normal FEES (non cancer)

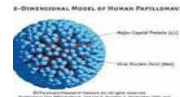


Associated Risk factors



New Risk factor: Human Papilloma virus (HPV)

- Sexually transmitted
- 70-80% of oropharyngeal cancers
- Most prevalent in tonsillar cancers
- HPV+ better survival rate than HPV-
- More common in young adults (<50 years)
- Males>females



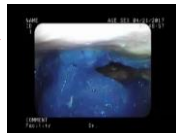
Oropharyngeal Tumors

- Associated with HPV
- Base of tongue
- Tonsil
- Soft palate



Causes reduced drive of the bolus/clearance

Swallowing is usually more effortful



Oral Tumors-(Oral Dysphagia)

- Lingual tumors cause reduced transfer of the bolus.
- Larger tumors will cause greater functional deficits

T1N2bM0 SCCa right tongue and FOM



T3N2bM0 L oral tongue



Laryngeal Tumors

- Glottic
- supraglottic

Causes reduced airway protection



Supraglottic swallow

1. Hold Breath
2. Swallow while holding breath
3. Cough
4. Swallow



Chemoradiotherapy

- Chemoradiation has been associated with better cure rates than radiation alone ¹

- Side effects of CRT > RT ²

¹ Pignon et al. (2000), Browman et al. (2001), Pignon et al. (2007), Budach et al. (2006), Forastiere et al. (2003)

² Mittal et al. (2003), Rosenthal et al. (2006)

Chemoradiotherapy

Treatment related toxicities



Dysphagia, dehydration, malnutrition, stiffness



↓ QOL / aspiration pneumonia, feeding tube dependent

Treatment is usually 7 weeks

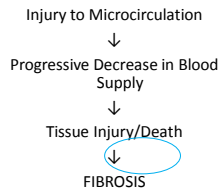
- General dosage is 70 Gy over a period of 7 weeks
- Swallowing changes are usually noted around week 3-4 for most patients.
- Permanent xerostomia (dry mouth) is 25 Gy

Acute Side Effects

- Ulcerations
- Xerostomia
- Mucositis
- Pain/odynophagia
- Dysgeusia



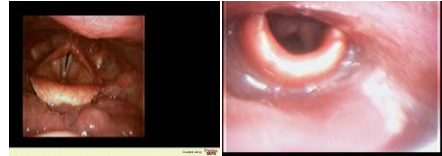
Late Radiation Effects



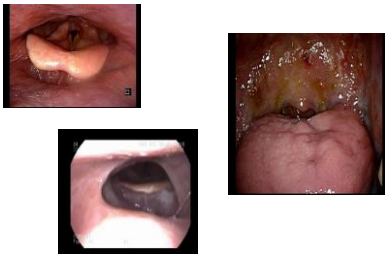
Radiation Changes

No Radiation

Post Radiation



Post CRT



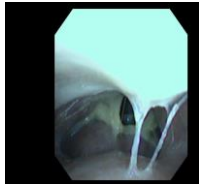
Late Radiation Effects

- Cranial neuropathies
- Osteoradionecrosis (aka ORN)
- Lymphedema



Lack of intervention:

- Impaired swallowing
- Dental complications from lack of saliva
- Reduced ROM
 - Discomfort/tightness/pain
 - Limited mobility of neck and tongue
 - Trismus



What is the evidence behind what we do?

Evidence for Proactive Swallowing Therapy

- ↑ QOL scores¹
- ↑ Base of tongue retraction and epiglottic inversion²
- ↑ Post-radiotherapy muscle mass on MRI³
- ↓ Shorter duration of feeding tube dependence⁴

1 Kulbersh et al (2006)
2 Carroll et al (2008)
3 Carrasby-Morris (2007)
4 Bhayani et al (DRS)

Prophylactic Exercise

Purpose: Prevent muscle fatigue

- Series of exercises targeting BOT, pharyngeal constrictors, and laryngeal elevators
- MBS 3 mos. post CRT
- Exercise group: better BOT retraction/epiglottic movement

Carroll et al, 2008

Ask Questions

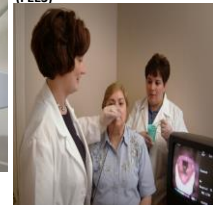
- Are you working with a speech-language pathologist?
 - If no, help facilitate referral
 - Are you taking anything by mouth?
 - if yes, do you use strategies?
- *Patients may want to drink during physical therapy session.

Instrumental Swallowing Studies

Videofluoroscopy (VFS), aka MBS



Fiberoptic Endoscopic Evaluation of Swallowing (FEES)



Purpose of Evaluation

- Identify:
 - cause of dysphagia
 - presence of aspiration
 - Presence of residue (location/amount)
 - Treatment plan (exercise, surgery, both?)
- Strategies/techniques that can reduce or eliminate the symptoms

Compensatory Strategies

- **Postural Maneuvers**
 - Chin down posture
 - Head rotation (L or R)
 - turn toward effected side
 - Head tilt (ear to shoulder)
 - Keeps bolus on stronger side
 - Neck extension
 - allows gravity to help with transfer
- **Swallowing Maneuvers**
 - Liquid wash (clears residue)
 - Effortful swallow
 - Breath hold
 - Cough-swallow
 - Multiple swallows
 - Supraglottic swallow
 - Super supraglottic swallow

FEES, pre treatment (BOT)



Next...

Enroll patient in swallowing therapy program during CRT or XRT

Use it or Lose it: Eat and Exercise during Radiotherapy and Chemoradiotherapy for Pharyngeal Cancers

- 497 patients (458 oropharynx, 39 hypopharynx)
 - Median age 56 (38-80)
 - 87% males
 - 91% treated with IMRT

Hutchinson, et al. (2013)

Use it or lose it: Eat and exercise during radiotherapy and chemoradiotherapy for pharyngeal cancers

- Results:**
- 26% NPO at end of treatment
 - 74% PO
 - 167 (34%) partial
 - 199 (40%) full oral intake
 - 87 puree liquid diets
 - 112 masticated foods
 - Eating and exercise ($p < 0.05$)
 - Better long term diet
 - Shorter length of G-Tube dependence

NPO as short as 2 weeks has been reported to show poor swallowing outcomes.

Gillespie M Brodsku M, Day T et al, Swallowing related to QOL after head and neck ca tx. Laryngoscope 114:1362-1367, 2004

Swallowing Program during CRT

EAT & EXERCISE

- Mandibular ROM to prevent trismus
- lingual ROM
- Tongue strengthening exercises/effortful swallow
- Hyolaryngeal elevation
- Compensatory strategies for safe eating
- Coach!

Eat & Exercise!!



Will need to modify the texture of food



Promote Eating Routine!

- Breakfast
- *Snack*
- Lunch
- *Snack*
- Dinner



Keep a food diary
Be prepared when going to chemo...pack food!

Ask Questions
Give Examples



Encourage High Calories!



+ 100 calories

Avoid...

Empty calories

Spicy and Acidic Food/drink



Coach...



Re-enforce strategies for safe and efficient swallowing (i.e. head turns, chin down posture, effortful swallows)

What happens after CRT?

- RTC for repeat evaluation teach "NEW NORMAL"
- Phase II: 8 weeks of aggressive swallowing therapy
 - Goals:
 - tube out
 - weight gain
 - functional safe swallow



Swallowing disorders in the first year after radiation Logemann et al (2008), Head and Neck

Results:

- BOT ↓
- epiglottic movement ↓
- delay in pharyngeal transit times
- poor coordination of swallowing muscles

Late Dysphagia After Radiotherapy Based TX of Head and Neck

Hutchinson et al (2012)

- H&N survivors ≥5 years referred to MBS study
 - Median yrs. post tx: 9 yrs.
- 29 patients (oropharyngeal, hypopharyngeal, laryngeal)
 - Oropharyngeal cancer 86%
 - T2-T3 75%
 - XRT 38%
 - CRT 62%
- Functional Measures –PAS, PSS-HN, NIH-SSS, MBS Imp

Results:

- All with Silent aspiration
- All with profound pharyngeal residue
- 69% benefited from strategies
- 66% g-tube dependent
- Chronic dysphagia was not due to stricture, but impaired hyolaryngeal elevation and reduced pharyngeal constriction

Video of late dysphagia



Learning points

- Obtain information (location, size, treatment)
 - How will this change function?
- Early intervention is key!
- Treatment related toxicities impair function/QOL
 - CRT >RT
- Educate Survivors about their “New Normal”
- Ask questions- collaborate with Speech to maximize function



ENT Survivorship Clinic

Rehabilitation:
Multifaceted Management
Where to start?

Musculoskeletal Impairments: A Survey

- Ghiam 2017 (N=29)
 - 69% neck disability
 - 35% shoulder pain and disability
 - Cervical ROM deficits in all directions
 - 33.4mm TMJ opening inter-incisal distance average
 - Digital photography-identified 93% with shoulder misalignment, 89% with head tilt, and 68% with postural deviation
- Etiology:
 - Tumor progression
 - Surgical intervention
 - Radical or modified neck dissection
 - Radiation or chemoradiation

Neuromuscular Exposure to Radiation Field

- Direct radiation exposure to:
 - Cervicothoracic paraspinals
 - Cervical nerve roots
 - Upper brachial plexus
 - Rotator cuff
- Weakens
 - Neck extensors
 - Rotator cuff
 - Lower trapezius
 - Deltoids
 - Rhomboids
- Refers pain into C5-6 due to inflammation/fibrosis

Stubblefield 2011

What is important to the patient?
NDI, DASH, AM-PAC, FACT H&N



PT Evaluation: Team-Integrated Considerations

- Next physician appointment
 - Have you lost weight?
 - Any changes since last appt.
- Dental plan
 - Fluoride trays ready for CRT/RT? Meticulous brushing and flossing?
- SLP reinforcement:
 - Home exercises?
 - Swallowing technique?
 - Are you eating? What types of foods are you able to eat?

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Shoulder Pain and Dysfunction

- Up to 100% of patients (Gane 2017) experience shoulder pain after neck dissection requiring effective differential diagnosis:
 - Nerve injury
 - Muscle strength and mobility changes
 - Scapulohumoral dyskinesia
 - Dyskinesia impacts entire upper quarter

Ludewig 2009, Goldstein 2012

Nerve Injury: Brachial Plexus

- N=330 patients underwent CRT/RT
 - 12% (40) patients reported neuropathy including
 - Ipsilateral pain (50%)
 - Numbness/tingling (40%)
 - Muscle weakness/atrophy (25%)
 - >5 years follow-up rate increased to 22%
 - Symptom severity increased with **prior neck dissection*** (p=0.01), CRT (p=0.01), **higher radiation dosage*** (p=0.001)
 - *independently predicative of symptoms

69 Chen 2012

Nerve Injuries and Scapular Winging

Spinal Accessory Nerve

Cranial Nerve XI

- Low shoulder
- Unable to fully elevate or **abduct arm**
- Downward scapular rotation
- **Scapular winging** with shoulder abduction not flexion
- Weak shoulder flexion over 90 degrees
- With H&N cancer, by 4-6 month outcomes were the same with radical or modified neck dissection (Erisen 2004)

Long Thoracic Nerve C5-7 anterior branches

- Less common (Hankins 2005)
- Loss of protraction strength/ROM with serratus involvement
- Inferior angle of scapula winging with wall push ups (Safran 2004)

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Neurologic Types of Scapular Winging

Spinal Accessory Nerve (CN XI) Palsy:
Visible atrophy of the trapezius creating
Downward movement of the scapula
(superior-medial impairment) with
winging of the scapula in shoulder
abduction but not in shoulder flexion

Long Thoracic Nerve Palsy:
Serratus anterior paralysis with
downward rotation of scapula
upon shoulder abduction
(Hankins 2005)

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Musculoskeletal Rehabilitation

- Provide the patient with optimal upper quarter mobility vs stability balance to meet their ADL requirements from lifting at work to golfing.
- McKneely 2011 Adherence to Exercise program
 - Exercise 3X/week for 12 weeks including AROM/PROM, Posture and resisted strength training.
 - 91% adherence rate with home exercise
 - Failure to adhere was correlated with daily alcohol intake, high anxiety, depression, and poor QOL.

Cervical Impairment

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ENT Survivorship NDI Preliminary Results

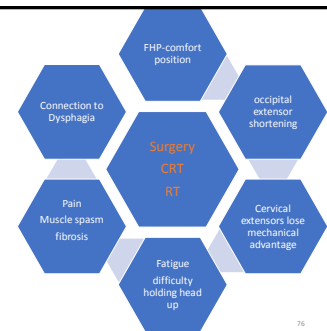
- 173 patients completed the NDI
- 55.5% indicated neck disability (n=96)
- >33% indicated moderate to complete impairment (n=33)
- Tumor sites
 - 44.5% (n=77) Oropharynx
 - 26% (n=45) Oral Cavity
 - 18.5% (n=32) Larynx
- Cancer Treatment
 - 42.2% (n=73) underwent non-operative treatment (RT or CRT)
 - 18.5% (n=32) underwent surgery
 - 39.3% (n=68) underwent surgery and adjuvant therapy**
 - > report disability

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Neck Disability Index

- Although neck disability has been an established effect of surgical resection in head and neck cancer patients, these current data demonstrate a **high prevalence of neck disability after non-surgical treatment including radiation therapy or chemotherapy.**
- Ganes (2017) in a systematic review indicated that few studies included neck outcome measures and that risk factors for ongoing neck disability have yet to be adequately investigated.
- **Surveillance for non-surgical treatment groups is necessary to ensure that early identification of impairment provides the patient opportunity to manage disability and improve their quality of life.**

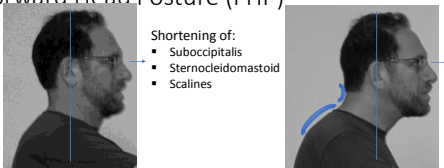
Multifaceted Interrelationships



Stubblefield 2011,

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Forward Head Posture (FHP)

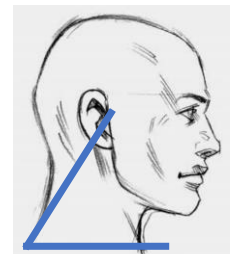


- FHP associated with worsening neck pain (Yip 2008, Lau 2010, Silva 2009, Sun 2014, Ruivo 2014, Silva 2010)
- FHP correlates with worsening NDI scores (MacDermid 2009 and Tang 2012)
- FHP not ideal to use swallowing strategies taught by SLP

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Measurement of FHP

- Craniovertebral angle (CVA)
 - C7 through tragus and parallel to floor
- Independent *t* test significant difference in the CVA between FHP and healthy groups ($P < 0.001$)
- Significant difference between CVA in standing and sitting for both groups ($P < 0.001$).
- **Standing posture was a more sensitive FHP measure**



Saghayegh Fard 2016

- **Rectus capitis posterior major and minor shorten** 27.6% and 23.6% respectively at 40 mm of FHP
- **Obliquus capitis superior shortens** 11.2% at 40 mm FHP

From: Cervical Spine Muscle-Tendon Unit Length Differences Between Neutral and Forward Head Postures: Biomechanical Study Using Human Cadaveric Specimens
Phys Ther. 2017;97(7):756-766. doi:10.1093/ptj/pzx040
Phys Ther. | © 2017 American Physical Therapy Association

Forward Head Posture: Patient Education

For every inch your head moves forward, it effectively gains 10 lbs!

Kapandji 2008

Multifaceted Management

- **Passive Interventions:**
 - Manual therapy
 - Joint mobilization
 - Soft tissue mobilization including IASTM
- **Patient-involved Interventions**
 - Flexibility: Cervical ROM in **cervical spine neutral**, SCM, Scanlines, Hyoid, pectoralis m's
 - Strength training: deep neck flexors and scapular stab
- Intersegmental mobility, muscle length/strength and postural alignment are interrelated provide multifaceted intervention
- Home management— **frequency is key**

Isolate Deep Head/Neck Flexors Longus Capitis/Longus Colli

- **ISOLATION:** Gently nod head as if saying yes to produce craniocervical flexion (no retraction)
 - Hold 10 seconds
 - monitor to avoid use of superficial neck flexors (SCM, Hyoid and Scalenus)
 - Falla 2007 used air filled pressure sensor

(Jull 2002, Jull 2005, Fella 2009)

Seated Practice

- Sit with hips 100 degrees, roll in to slight lordosis, WB on ischial tuberosities
- **Sternal lift** by anterior thoracic shift with elevation (monitor for T-L extension)
- **Occipital elevation** to achieve neutral head position (away from upper cervical extension)

83 Falla 2007, Raney 2009

Endurance-Strength Training Deep Head/Neck Flexors

- Scapular retraction and depression in combination of occipital elevation activates the longus colli
- Hourly self correction in sitting and standing postures to change the current motor plan

Falla 2007, Raney 2009

Home Management: Snow Angels

- May start with pool noodle or towel rolled between shoulder blades
- May start with pillow(s) under the head and shoulders
- Special Considerations
 - Laryngectomy pts
 - Frail/poor transfer skills

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Empower the Survivor to Change

- PT strength, flexibility and postural changes at the neck can impact swallowing, tongue function and support SLP goals
- Swallowing in the chin-tuck position (head and neck flexion) may important as a postural technique that reduces aspiration risk and increases the likelihood of successful life-long eating.

Logemann 1989, Lewin 2001

Anterior Neck: Improve Mobility

87 Henry Gray. Anatomy of the Human Body 1912

These tissues are made for moving!

Improve function: During swallow, the suprahyoid and thorohyoid muscles lift the hyoid and larynx, pulling the larynx under the tongue allowing the epiglottis to cover the larynx to avoid aspiration.

Matsuo 2009

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Henry Gray. Anatomy of the Human Body 1912

Swallowing

- PT can augment SLP swallowing exercise and treatment by assisting in improved mobility of radiated tissues.
- Manual mobilization anterior structures: hyoid bone and thyroid cartilage, muscles and scar
- These folks often feel like they have difficulty breathing/sense of choking)
Give them relief!

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Impaired Breathing Patterns

- Common breathing pattern: chest breathing, shoulder elevation
 - Teach diaphragmatic breathing
 - Sympathetic quieting
 - Myofascial soft tissue mobilization

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Balance

- Assessment
 - Traditional balance testing
 - Thoracic rotation
 - Disassociation between thoracic and pelvic motion
- Treatment-improve mobility on core stability
- Debilitated/frail patients are at risk

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Radiation Fibrosis, Scarring and Myofascial Pain Syndrome

- Radiation-damaged endothelial cells lining small vessels produce ischemia, edema, and inflammation with resultant fibrosis and potential cording.

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Treatment: Radiation Fibrosis, Scarring and Myofascial Pain Syndrome

- Manual mobilization or IASTM of scar and radiated tissue
- Flexibility, PRE's, yoga, and aerobic for pain management
- Use of silicone pads, elastomer, or soft spots to break up fibrosis
- Low level laser therapy (17 points along the scar, 2 rounds of PT sessions at 3 times per week for 3 weeks)

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Trismus

- <35mm mouth opening measured by the inter-incisor distance (IID)
- Use hygienic measurement practices every time
- Prevalence: 42% of patients with post-treatment trismus
- Incidence highest
 - post treatment for parotid gland tumors, nasopharyngeal and tonsillar cancers
 - Poor physical condition prior to start of RT at > 50 Gy OR RT at > 60 Gy of masticatory structures

Rapidis 2015, Pauli 2013, Teguh 2008

Effects of Trismus

- Impedes chewing, speech, and swallowing oral hygiene, tumor surveillance, airway maintenance and insertion of obturator after maxillectomy.

Kraaienga 2015, Rapidis 2015

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Recurrence

- **Recurrent or metastatic disease**
- >50% of patients with locally advanced squamous cell oropharyngeal cancers develop recurrence or metastasis which are usually detected within the first 2 years of treatment.
- Trismus may be a sign of recurrence. Think before treating

Athanasios 2008

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Trismus: Extraarticular Factors

- Mandibular depression: lateral pterygoid
- Mandibular elevation: temporalis, masseter, medial pterygoids
- Mandibular protrusion: lateral pterygoid, masseter, temporalis
- Mandibular retraction: temporalis (posterior fibers) and masseter (deep fibers)
- Lateral motion: contralateral lateral pterygoid and bilateral temporalis Teguh 2008

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Henry Gray. Anatomy of the Human Body 1912

Trismus: Intra-articular

- **CAUTION:** irradiated joints are not appropriate for aggressive mobilization.
 - Greatest risk for osteoradionecrosis 6-12 months post radiation
 - Necrosis occurs when irradiated tissues no longer regenerate cells at a sufficient rate to keep up with the daily wear and tear on the system.
 - Consider where your therapeutic technique falls along the risk-benefits continuum

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Mouth opening reduces on average, 20% after RT

- “Exercise therapy is the mainstay of treatment and exercise should start as soon as possible after treatment. The prevention of trismus, rather than its treatment, is the most important objective.”

AD Rapidis 2015

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Current Practice: Management of Trismus

- Heat
- Massage-external and intraoral
- Mouth opening and stretching
- Contract relax
- AROM at home
- Tools:
 - TheraBite Jaw Motion Rehabilitation System
 - 7X/day X7 repsX7sec
 - 5X5X30sec
 - Contract/relax with agonist contract
 - Tongue depressors
 - Cork screw devices

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Dijkstra 2006, <http://www.cranio rehab.com/therabite>

Montalvo 2017

- N=15 trismus patients underwent 10 week exercise
 - .7-14.8 years post oncologic treatment (ave 6.2)
 - Maximal interincisal opening improved
 - 3.5 mm, 15.3%, p=0.0002
 - 4.7 mm, 22.1%, p=0.0029 at 6 mo follow-up
 - Increased MIO was correlated with fewer trismus s/s

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Augmenting Current Trismus Management

- Increase frequency of self-management
- Affect muscles directly
- Judicious joint mob.
- Education: Pre CRT

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Intraoral MTT

- Lateral Pterygoid
Horizontal under TMJ to sphenoid (protrude/open/contralateral)
- Medial Pterygoid
Vertical just behind back teeth (close along with masseter and temporalis)

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Oral Assessment beyond TMJ

- Teeth are placed at risk due to radiation and require fastidious care directed by a dentist
- Are teeth solid or will intraoral MTT/strength training possibly dislodge a tooth?
- If trismus is present, use of tongue depressors is contraindicated with loose teeth which may break off and be swallowed.
- Referral to dentistry is appropriate if there are any periodontics concerns



Oral Assessment beyond TMJ

- Assessment:
 - Scarring-limits tongue ROM, coordination, speech, and capacity to chew/swallow food
 - Swelling-impairs ROM, speech, and strength
- Treatment:
 - soft tissue mobilization
 - ROM-impairs ability to chew swallow and speech
 - Augment SLP instruction with strength and coordination exercise—we are motor control experts!

Radial Free Flap: Tongue Reconstruction

- This patient will benefit from intraoral massage and motor relearning.
Attend to donor site—radius

Intraoral Radiation Effects

- Modulation of intra-oral treatment based upon tissue tolerance on any given treatment day
- Emphasis on other involved structures
 - Neck, shoulder, posture, strength training, physical activity, education, reinforcing multifaceted patient instructions.

Lymphedema

- 300 Lymph nodes
- 30% of entire lymph system
- Onset 2-6 mo then may resolve
- **External lymphedema**—skin and subcutaneous
- **Internal lymphedema**—tongue, mouth pharynx larynx

Deng 2011, 2012

Henry Gray (1821–1865). Anatomy of the Human Body. 1918.

High Symptom Burden in those with Lymphedema

- > 15% difference comparing 23 matched pairs ($p < 0.05$) of patients with lymphedema to those without
 - Altered sensation: numbness, tightness, heaviness, warmth
 - Pain without head or neck movement
 - Difficulty swallowing soft foods
 - Difficulty breathing
 - Blurred vision
 - Feeling worse when flying
 - Swelling

111 Deng 2016

Factors Associated with Secondary Lymphedema Development (n=81)

- Pharyngeal cancer as compared to other tumor sites with external ($P=.004$) and combined ($P=.032$)
- Recent time since end of treatment with external ($P=.004$) and combined (.005)
- Radiation dosage ($P=.010$) and days of radiation ($P=.017$)
- Radiation of surgical bed Internal lymphedema; surgery with postop radiation, and surgery in irradiated field ($P=.008$)
- Number of treatment modalities with external ($P=.002$) internal ($P=.039$) combined ($P=.004$)

Deng 2012

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Lymphedema Management: Retrospective Analysis (n=32)

- Retrospective analysis of 32 records
 - Treatment: manual lymphatic drainage massage, exercises, patient education, and compression
 - Duration: 23.9 ± 14.8 sessions
 - Objective Change: Significant reduction of lymphedema ($p < .05$) and pain (from 7.8 ± 2.2 to 3.6 ± 1.6 ; $p < .001$)

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Treatment

- MLD, pneumatic compression, compression garments/devices, vacuum therapy for scars and fibrosis, low level laser, facial and tongue exercises, neck and shoulder exercises for ROM and strengthening, patient education (self massage, skin care, home exercise)
- Adapt MLD based upon tumor, surgical, and radiation site.

Smith 2010, Oppenheimer, Wigg 2004, 2009

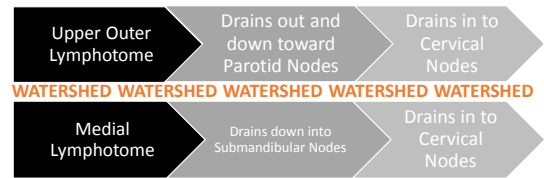
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Management Considerations

- Collateral lymphatic (venous) pathways are limited in the head and neck area
- Supine position worsens lymphedema
- Warmer temperatures can worsen lymphedema

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MLD of the Head and Neck



Oppenheimer 2004

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Pneumatic Compression Feasibility Study:

Mavrovitz 2018

- Feasibility Study:
- Mayrovitz 2018
- Single treatment
- edema reduction of face: (82.5±4.3 cm vs 80.9±4.1 cm; P<.001) and neck (120.4±12.2 cm vs 110.2±12.1 cm; P<.001)

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H&N Cancer Survivorship and Exercise

- 50% of H&N cancer survivors were sedentary at diagnosis.
 - Of those that exercised at diagnosis, most did not return to their pre-diagnosis exercise level
 - May not be possible for full return to exercise due to long-term effects.
- Evidence is beginning to demonstrate that both fatigue and feeling of well-being may improve with ex. in the H&N Cancer population—spread the word!

ACS Guidelines 2012, Rogers 2006, Sammut 2014

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H&N Cancer Survivorship and Exercise

- With the growing survivorship population and the longer life expectancy with long-term effects. Return to exercise and sport is one of the opportunities we have as physical therapists!
- ACS Guidelines:
 - 150 minutes per week moderate exercise or 75 minutes per week vigorous aerobic exercise (LOE 1, 1A)
 - Strength training two days per week (LOE 1A)

Head and Neck Cancer Management

- This is in no way an exhaustive list of impairments associated with those with ENT cancers.
- This patient population is an orphan population whose orthopedic, myofascial, neurologic and functional impairments have not been adequately investigated in current literature.
- Please consider this presentation a blueprint from which to build your rehabilitation management thought process for Head and Neck Cancer patients.
- Life-long management strategies are key to reduction of late and long term impairments

UPMC ENT Survivorship Clinic

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Thank you for your time!

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