


1<sup>st</sup> Annual MSKCC Cancer Rehabilitation Symposium

**Adaptive Strategies and Interventions for Radiation Fibrosis Syndrome**

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The presenters have no conflict of interest to report regarding any commercial product/manufacture that may be referenced during this presentation.



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Objectives of Lecture

- Recognize the variety of radiation fibrosis syndrome presentations
- Appreciate the importance of postural re-education across presentations
- Identify at least one starting point for treatment intervention



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### Radiation Fibrosis Syndrome

- Definition
  - “...insidious pathologic fibrotic tissue sclerosis that often occurs in response to radiation exposure.”
  - “myelo-radiculo-plexo-neuro-myopathy”

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Stubblefield, 2011

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### Radiation Effects

Effect	Timeframe
Acute	During or immediately after radiation treatment
Early Delayed	Up to 3 months after completion
Late Delayed	Occurring > 3 months after completion

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Stubblefield, 2011

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### Pathophysiology

Histopathological Phase	Characteristics
Prefibrotic	Chronic inflammation
Organized Fibrosis	Active fibrosis; unorganized matrix
Late Fibroatrophic	Retractile fibrosis

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### Populations at Risk

<b>Diagnosis</b> <ul style="list-style-type: none"><li>• Hodgkin's Lymphoma</li><li>• Breast Cancer</li><li>• Head and Neck Cancers</li></ul>	<b>Contributing Factors</b> <ul style="list-style-type: none"><li>• Dose</li><li>• Depth</li><li>• Field</li></ul>
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### Clinical Presentation "Head-Dropped Syndrome"

<b>Muscles affected</b> <ul style="list-style-type: none"><li>– Cervicothoracic paraspinals</li><li>– Rhomboids</li><li>– Middle/lower traps</li><li>– Shoulder girdle musculature<ul style="list-style-type: none"><li>• Biceps</li><li>• Deltoid</li><li>• Rotator cuff muscles</li></ul></li></ul>	<b>Nerves Affected</b> <ul style="list-style-type: none"><li>– Upper cervical nerve roots</li><li>– Upper plexus</li></ul>
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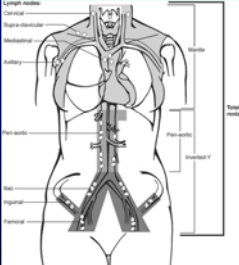
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### Total Nodal Radiation Field



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### "Head-Dropped Syndrome"

(B)



Stubblefield, 2011



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### "Head-Dropped Syndrome"

(A)



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### Clinical Presentation Brachial Plexopathy

- Nerves Affected
  - Brachial plexus at trunk level
  - Typically upper trunk in HNC
  - Gives rise to suprascapular n., musculocutaneous n.
  - Contributes to posterior cord, radial n., median n.
- Muscles Affected
  - What's in/what's out

Stubblefield, 2011



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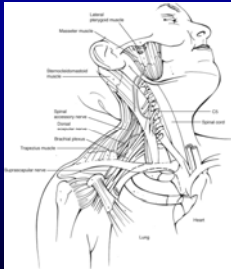
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### Brachial Plexus Anatomy



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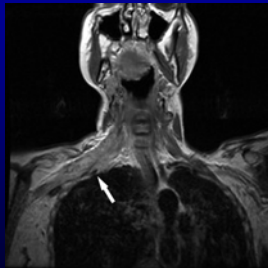
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### MRI – Brachial Plexopathy



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### Clinical Presentation Shoulder Dysfunction

- Occurs when  
*“...shoulder muscles, nerves innervating the shoulder girdle or other shoulder structures are affected by radiation.”*

Stubblefield, 2011



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### Potential Shoulder Pathologies

- Rotator Cuff Tendinitis
- Adhesive Capsulitis
- Scapular Dyskinesia
- Impingement Syndrome

Stubblefield, 2011



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### Shoulder Dysfunction



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### Role of Occupational Therapy within Oncology

- *“to facilitate and enable an individual patient to achieve maximum functional performance, both physically and psychologically, in everyday living skills regardless of his or her life expectancy.”* - Penfold, 1996

Stubblefield, 2011



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**RESTORATIVE  
REHABILITATION  
INTERVENTIONS**



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Manual Therapy

- Myofascial Release
  - Technique to reduce adhesions between layers of skin, fascia and muscle
- Stretching
  - Goal of increasing tissue length to facilitate improved joint and functional movement
- Joint Mobilization
  - Improve joint play/mobility

Cooper, J. 1998



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Manual Therapy

- Massage
- Contract/relax
- Oscillations
- Contour clearing
- Ligament releases



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### P/AA/AROM

- Wand therex
  - Flexion
  - Horizontal ad/abduction
  - Abduction
  - Circumduction
  - External Rotation
  - Internal Rotation
  
- PROM to all joints without active movement

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Cooper, J. 1998

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### Strengthening

- Comprehensive UE program
  - Isotonic for muscles with antigravity strength
  - Isometric for muscles with AROM in gravity eliminated plane
  - "Place and hold" for muscles with minimal active movement

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### Theraband in Supine



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### Scapular Stabilization

- Strengthen
  - Innervated muscles
  - Other muscles to compensate and stabilize scapula
- Closed-chain therex
- Taping



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### Neuromuscular Re-Education

- Postural Education
  - Maintain upright posture as able
  - Not to the point of exhaustion
  - Daily practice



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### Neuromuscular Re-education



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### Neuromuscular Re-education

- Integration
  - Activity participation for retraining of motor plans to incorporate positive changes in alignment and strength



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### Postural Re-education

- Mirror for visual feedback
- Tactile cuing
- Graded reaching
- Cervical proprioception
- Activity analysis for functional integration

Revel et al., 1991



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### Nerve Glides

- Brachial plexus glides
- Median nerve glides

*\*\*Must know mechanism of injury*

*\*\*Nerve glides are contraindicated with BP tumor*



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### Nerve Glides

<b>Brachial Plexus</b>	<b>Median Nerve</b>
	
	

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### Sensory Re-Education

- Sensory wands
- Vibration
- Theraputty

	
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### Coordination/Dexterity Activities

- Pegs
- Coins
- Beans
- Fastening buttons
- Jewelry fasteners


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**SUPPORTIVE  
REHABILITATION  
INTERVENTIONS**



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Functional Impact – Activity Analysis

- Eating
- UE dressing
- Computer use
- Writing
- Opening doors
- Leisure tasks



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Feeding Modifications



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Headmaster



Stubblefield, 2011



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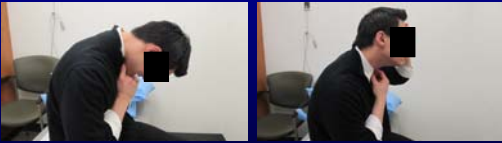
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Dressing Modifications



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Dressing Positioning Modification



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## Workstation Ergonomics

- Supported upright posture
  - Goal is to facilitate functional performance of work tasks
  - Include head support
  - Tilt or recline as needed
  - Support feet
  - Adjust monitor for visual regard from supported head alignment
  - Keyboard within reach with elbows at sides



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## Workstation Setup Ideas



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## Computer Modifications



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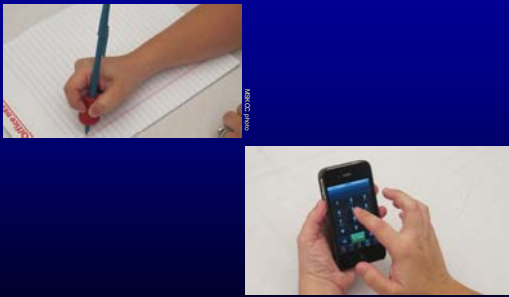
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### Writing and Phone Use



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### Opening Doors

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### Leisure Tasks

- Activity Analysis
  - Yoga
  - Feeding pets
  - Carpentry

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Leisure Task - Yoga



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
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Yoga – Sun Salutation



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Energy Conservation

- Take supported rest breaks BEFORE fatigue sets in
- Reaching overhead
  - Move frequently used items to countertop height or within comfortable range
  - Support elbow on wall/shelf for sustained overhead reaching
  - Support extremities during computer use

Cooper, 1998



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### Patient Safety Education

- Protection of desensitized hand
  - Visual regard
  - Thermometer
- Positioning of upper extremity
  - Slings
  - Chair armrest

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Cooper, 1998

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### Orthotic Fabrication

- Static
  - Wrist support
  - Thumb opposition
- Dynamic
  - Tenodesis

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Cooper, 1998

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### Conclusion

- Importance of Activity Analysis for client-centered interventions
- Dual approach
  - Restorative
  - Supportive
- Postural Re-education

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**Thank You**




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