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

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
Radiation Fibrosis Syndrome

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

Radiation Effects

<table>
<thead>
<tr>
<th>Effect</th>
<th>Timeframe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute</td>
<td>During or immediately after radiation treatment</td>
</tr>
<tr>
<td>Early Delayed</td>
<td>Up to 3 months after completion</td>
</tr>
<tr>
<td>Late Delayed</td>
<td>Occurring &gt; 3 months after completion</td>
</tr>
</tbody>
</table>

Pathophysiology

<table>
<thead>
<tr>
<th>Histopathological Phase</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prefibrotic</td>
<td>Chronic inflammation</td>
</tr>
<tr>
<td>Organized Fibrosis</td>
<td>Active fibrosis; unorganized matrix</td>
</tr>
<tr>
<td>Late Fibroatrophic</td>
<td>Retractile fibrosis</td>
</tr>
</tbody>
</table>
Populations at Risk

**Diagnosis**
- Hodgkin’s Lymphoma
- Breast Cancer
- Head and Neck Cancers

**Contributing Factors**
- Dose
- Depth
- Field

Clinical Presentation “Head-Dropped Syndrome”

- **Muscles affected**
  - Cervicothoracic paraspinals
  - Rhomboids
  - Middle/lower traps
  - Shoulder girdle musculature
    - Biceps
    - Deltoid
    - Rotator cuff muscles

- **Nerves Affected**
  - Upper cervical nerve roots
  - Upper plexus

Total Nodal Radiation Field
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
Brachial Plexus Anatomy

MRI – Brachial Plexopathy

Clinical Presentation Shoulder Dysfunction

- Occurs when

  "...shoulder muscles, nerves innervating the shoulder girdle or other shoulder structures are affected by radiation."
Potential Shoulder Pathologies

• Rotator Cuff Tendinitis
• Adhesive Capsulitis
• Scapular Dyskinesis
• Impingement Syndrome

Shoulder Dysfunction

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, 1986
RESTORATIVE REHABILITATION INTERVENTIONS

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

Manual Therapy

• Massage
• Contract/relax
• Oscillations
• Contour clearing
• Ligament releases
P/AA/AROM

• Wand therapy
  – Flexion
  – Horizontal add/abduction
  – Abduction
  – Circumduction
  – External Rotation
  – Internal Rotation

• PROM to all joints without active movement

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

 Theraband in Supine
Scapular Stabilization

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

Neuromuscular Re-Education

- Postural Education
  - Maintain upright posture as able
  - Not to the point of exhaustion
  - Daily practice
Neuromuscular Re-education
• Integration
  – Activity participation for retraining of motor plans to incorporate positive changes in alignment and strength

Postural Re-education
• Mirror for visual feedback
• Tactile cuing
• Graded reaching
• Cervical proprioception
• Activity analysis for functional integration

Nerve Glides
• Brachial plexus glides
• Median nerve glides

**Must know mechanism of injury
**Nerve glides are contraindicated with BP tumor
Nerve Glides

Brachial Plexus  Median Nerve

Sensory Re-Education

• Sensory wands
• Vibration
• Theraputty

Coordination/Dexterity Activities

• Pegs
• Coins
• Beans
• Fastening buttons
• Jewelry fasteners
SUPPORTIVE REHABILITATION INTERVENTIONS

Functional Impact – Activity Analysis

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

Feeding Modifications
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

Workstation Setup Ideas

Computer Modifications
Writing and Phone Use

Opening Doors

Leisure Tasks

- Activity Analysis
  - Yoga
  - Feeding pets
  - Carpentry
Leisure Task - Yoga

Yoga – Sun Salutation

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
Patient Safety Education

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

Orthotic Fabrication

• Static
  – Wrist support
  – Thumb opposition
• Dynamic
  – Tenodesis

Conclusion

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

References


References

- http://www.wheelchairnet.org/WCN_ProdServ/Clinicians/Tilt_vs_recline.html