The Spine

The learning company

2025

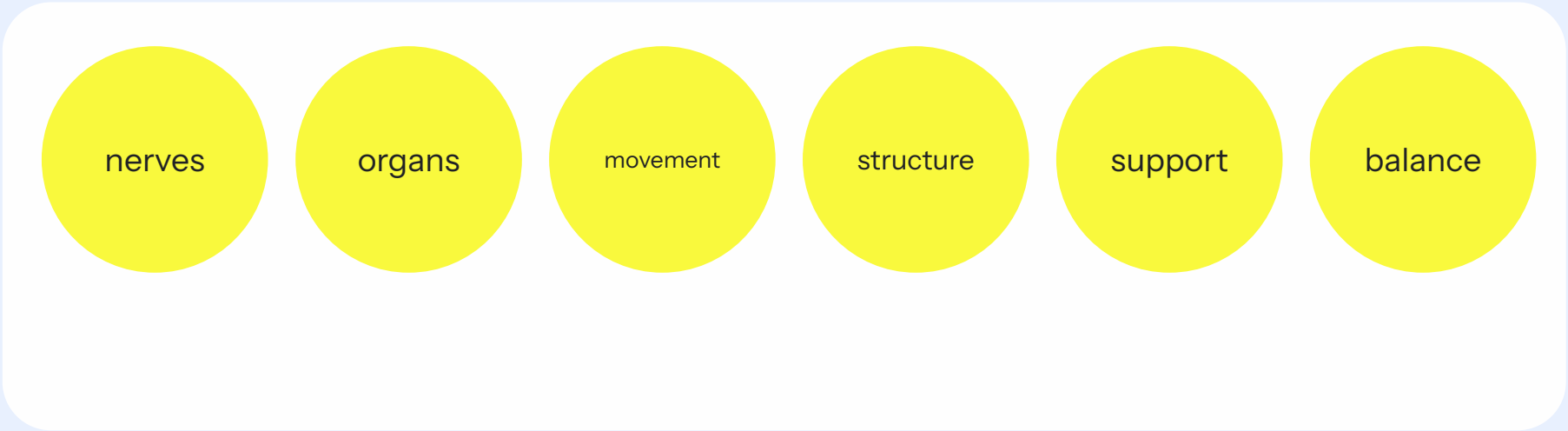
Summary of contents

Summary of contents

Let’s get started. The spine is a very dynamic structure. It can affect all areas of the body. Spinal dysfunctions can be debilitating. Always remember that pain is different for everyone and our perceptions of it are important.

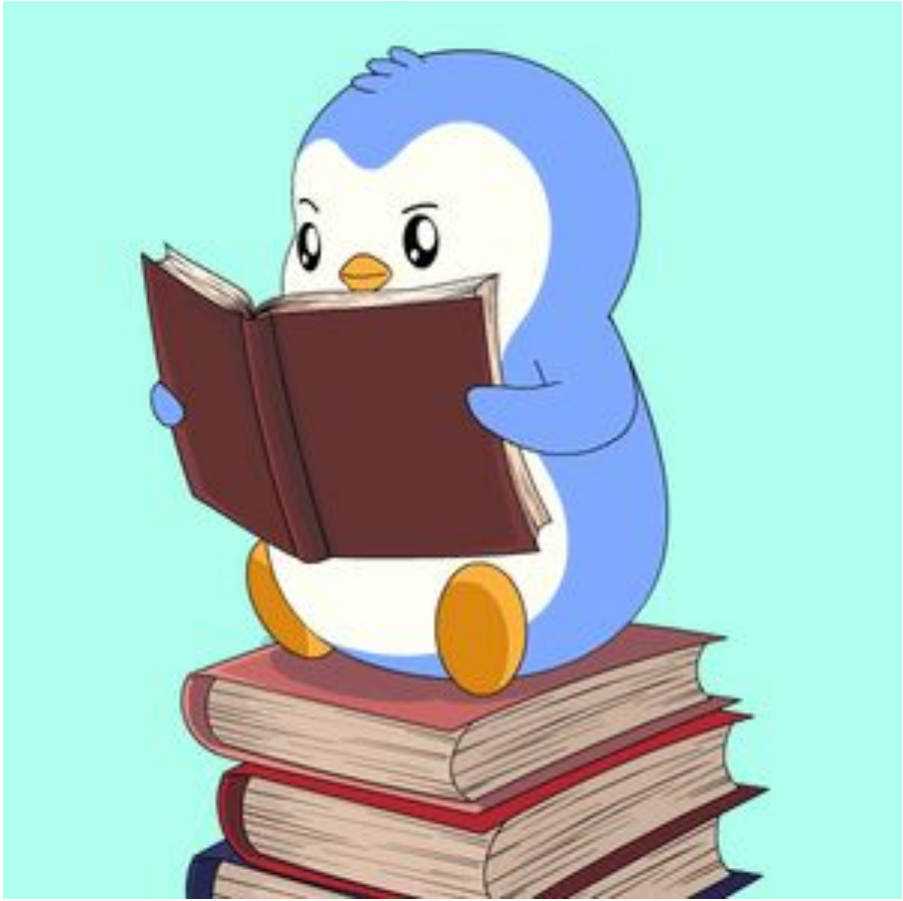
First things first

Think of all the thing that the spine can affect...



Time to read

Read pages 444-455
All things in the textbook are likely to be on the exam.



General guidelines: acute phase

Use of modalities, myofascial release, and massage to decrease pain and swelling for acute symptoms. Kinesthetic training of neutral or functional spinal posture, nondestructive movements in pain-free ROM, awareness and activation of deep musculature, and basic functional training that doesn't make symptoms worse.
Fundamental to to all interventions:

- Patient education: engage patients in all aspects of intervention, including; anticipated outcomes, healing time, and precautions and contraindications.
- Symptom relief or comfort: functional position or functional range education. This may change as tissues heal.
- Kinesthetic awareness of safe postures and effects of movement: teach patient to identify and assume spinal position that is most comfortable and reduces symptoms
- Muscle performance: deep segmental muscle activation and basic stabilization
- Basic functional movements: perform simple movements for ADL's while protecting the spine in the functional position.

BOX 15.5 MANAGEMENT GUIDELINES—
Acute Spinal Impairments/Protection Phase

Impairments, Activity Limitations, and Participation Restrictions

Pain and/or neurological symptoms
Inflammation
Guarded posture (prefers flexion, extension, or nonweight bearing)
Limited ability to perform ADLs and IADLs

Plan of Care	Intervention
1. Educate the patient.	1. Engage patient in all activities to learn self-management. Inform patient of anticipated progress and precautions.
2. Decrease acute symptoms.	2. Modalities, massage, traction, or mobilization/manipulation as needed. Rest only for first couple days if needed.
3. Teach awareness of neck and pelvic position and movement.	3. Kinesthetic training: cervical and scapular motions, pelvic tilts, neutral spine.
4. Demonstrate safe postures.	4. Practice positions and movement and experience effect on spine. Help patient find the functional spinal position of comfort in supine, sitting, standing.
5. Initiate neuromuscular activation and control of stabilizing muscles.	5. Deep segmental muscle activation techniques: ▪ Lumbar spine: drawing-in maneuver, multifidus contraction. ▪ Cervical spine: gentle head nods Basic stabilization: with arm and leg motions (passive support if needed, progress to active control).
6. Teach safe performance of basic ADLs; progress to IADLs.	6. Roll, sit, stand, and walk with safe postures. Progress tolerance to sitting longer than 30 minutes, standing longer than 15 minutes, and walking > 1 mile.

Symptom relief or comfort

Extension bias-extension syndrome
- Symptoms are lessened with extension (lordosis)
- Sustained or repetitive flexion motions load the anterior disc region, causing fluid redistribution from the compressed areas and swelling and creep in the distended areas.
- Injured disc or swollen/stressed tissues, repeated extension motions and positions will relieve the symptoms.
- Some patients will present with a lateral shift... this usually needs to be corrected before extension relieves symptoms

Flexion bias-flexion syndrome
- Symptoms are lessened with flexion worse with extension
- Compromised facets, intervertebral foramen, or spinal canal; bony spinal stenosis, spondylosis, and spondylolisthesis

Nonweight-bearing bias-traction syndrome
- Symptoms are lessened in nonweight-bearing positions (lying down or traction) or when spinal pressure is reduced (leaning on the upper extremities, leaning the trunk against support, or in a pool)
- Gravity sensitive worse when walking, standing, running, coughing, or similar activities
- Traction and aquatic exercises are often the only intervention in the acute phase

Muscle performance: deep segmental muscle activation and basic stabilization

Lumbar region

- “Drawing-in” maneuver is used to activate the transverse abdominis and a gentle bulging contraction of the multifidus
- Facilitation techniques are described in segmental activation section of chapter 16

Cervical region

- Gentler head nods and slight flattening of the cervical lordosis in the supine position are used for activation of the longus colli and multifidus

Basic stabilization

- Simple upper and lower extremity motions with the spine stabilized are added to the intervention to initiate training of the global stabilizers
- *Passive prepositioning* is used if the patient is unable to actively maintain hi sor her functional position
- For both lumbar and cervical; first do “drawing-in” maneuver followed by gentle arm motions within pain free range. Leg motions require more lumbopelvic control and should only be added in once the patient can demonstrate pelvic control and the symptoms dont get worse with movement.

General guidelines for managing subacute spinal impairments: controlled motion phase

When the signs and symptoms of the inflammatory process are under control and pain is no longer constant, the patient is progressed through a program of safe muscle endurance and strengthening exercises to prepare the tissue for functional activities and rehab training.

Make sure that functional movements are done safely. Pain may still interfere with ADL's but isn't constant.

Intervention at this stage is critical. Patient may feel good and overdo themselves and re-injure themselves.

Cervical and lumbar problems require controlled motion interventions

Underlying impairments

- Poor neuromuscular control and stabilization
- Poor postural awareness and body mechanics
- Decreased flexibility and strength
- Generalized deconditioning

BOX 15.7 MANAGEMENT GUIDELINES—
Subacute Spinal Problems/Controlled Motion Phase

Impairments, Activity Limitations, and Participation Restrictions

Pain: only when excessive stress is placed on vulnerable tissues
Impaired posture/postural awareness
Impaired mobility
Impaired muscle performance: poor neuromuscular control of stabilizing muscles; decreased muscle endurance and strength
General deconditioning
Limited ability to perform IADLs for extended periods of time
Poor body mechanics

Plan of Care	Intervention
1. Educate the patient in self-management and how to decrease episodes of pain.	1. Engage patient in all activities emphasizing safe movement and postures. Home exercise program. Ergonomic adaptation of work or home environment.
2. Progress awareness and control of spinal alignment.	2. Practice active spinal control in pain-free positions and with all exercises and activities. Practice posture correction.
3. Increase mobility in restricted muscles/joint/fascia/nerve.	3. Joint mobilization/manipulation, neuromobilization, muscle inhibition, self-stretching.
4. Teach techniques to develop neuromuscular control, strength, and endurance.	4. Progress stabilization exercises; increase repetitions (emphasize muscle endurance). Initiate extremity-strengthening exercises in conjunction with spinal stabilization.
5. Develop cardiopulmonary endurance.	5. Low to moderate intensity aerobic exercises; emphasize spinal bias.
6. Teach techniques of stress relief/relaxation.	6. Relaxation exercises and postural stress relief.
7. Teach safe body mechanics and functional adaptations.	7. Practice stable spine lifting, pushing/pulling, and reaching practice activities specific to desired outcome emphasizing spinal control, endurance, and timing.

Pain modulation

At this stage, use of modalities to modulate pain is not recommended. Emphasis is placed on increasing patient awareness of posture, strength, mobility, and spinal control and their relationship to modulating pain

Kinesthetic training

Progressed by using reinforcement techniques. Feed-forward control of the deep segmental musculature, active control of the spinal position, and correct posture are reinforced in a variety of ways until activation and control become habitual. Kinesthetic training overlaps stabilization exercises.

Stretching and manipulation

Decreased flexibility in joints, muscles, and fascia may restrict the patient's ability to assume normal spinal alignment. Manual techniques and safe self-stretching techniques are used to increase muscle, joint, and connective tissue mobility.

Massage therapist do not do manipulation we do however do mobilizations.

Muscle performance

Exercises are progressed with increased challenges for control, muscular endurance, and strength in the spinal stabilizing muscles; these exercises include activities that increase control and strength in the extremity musculature in conjunction with spinal stabilization.

- Stabilization exercises are used to emphasize movement and resistance to the extremities while maintaining control of the spinal position. Increase time and repetitions to build muscular endurance
- Wall slides, partial squats, partial lunges, pushing, and pulling against resistance to strength the extremities for lifting, reaching, pushing, and pulling activities.
- Once effective spinal control is learned a variety of stabilization exercise routines, dynamic trunk and neck strengthening exercises (curl-ups, back extension, and cervical motions) are introduced.monitor symptoms and modify any activities.

Cardiopulmonary conditioning

Aerobic capacity is usually compromised after injury. It is important to guide the patient in the initiation of or safe return to an aerobic conditioning program. Help the patient identify activities that do not exacerbate spinal symptoms and set goals and progressions to achieve desired outcome.

Postural stress management and relaxation exercises

Commonly symptoms are worse with sustained postural stress such as sitting at a computer, talking on the phone (head tilted), using mobile devices, or repeated forward bending (shoe salesman). We need to analyze their work, home, or recreational postures and activities. Advise patient on methods to correct the sustained, or repetitive postural stress.
Frequent changes of position and movement through pain free ROM are encouraged.
You may have to teach them to consciously relax tension in the muscles to relieve stress.

Functional activities

Once the patient has learned spinal control and stabilization and has adequate flexibility and strength for specific tasks, components of the task are incorporated into the exercise program and then into the patient's daily lifestyle. Safe body mechanics are included in all aspects of care.

General guidelines for managing chronic spinal impairments: return to function phase

Patients treated through previous stages should have minimal structural or functional impairments that prevent or restrict ADL's. Patients who do heavy lifting or high demand sports may require additional rehab training.

Conditioning and spinal control during high-intensity and repetitive activities are emphasized

Underlying impairments that interfere with desired outcomes must be dealt with

impairments in...

- Strength
- Endurance
- Neuromuscular control
- Skills related to functional goals

BOX 15.8 MANAGEMENT GUIDELINES—
Chronic Spinal Problems/Return to Function Phase

Impairments, Activity Limitations, and Participation Restrictions

Pain: only when excessive stress is placed on vulnerable tissues in repetitive or sustained nature for prolonged periods
Poor neuromuscular control and endurance in high-intensity or destabilized situations
Flexibility and strength imbalances
Generalized deconditioning
Limited ability to perform high-intensity physical demands for extended periods of time

Plan of Care	Intervention
1. Emphasize spinal control in high-intensity and repetitive activities.	1. Practice active spinal control in various transitional activities that challenge balance.
2. Increase mobility in restricted muscles/ joints/fascia/nerve.	2. Joint mobilization/manipulation, neuromobilization, muscle inhibition, self-stretching.
3. Improve muscle performance; dynamic trunk and extremity strength, coordination, and endurance.	3. Progress dynamic trunk and extremity resistance exercises emphasizing functional goals.
4. Increase cardiopulmonary endurance.	4. Progress intensity of aerobic exercises.
5. Emphasize habitual use of techniques of stress relief/relaxation and posture correction.	5. Motions and postures to relieve stress.
6. Teach safe progression to high-level/ high-intensity activities.	6. Apply any ergonomic changes to work/home environment.
7. Teach healthy exercise habits for self-maintenance.	7. Progressive practice using activity-specific training consistent with desired functional outcome, emphasizing spinal control, endurance, balance, agility, timing, and speed.

Management guidelines: nonweight-bearing bias

During examination, some patients do not respond to extension, flexion, or even midrange spinal positions or motions due to the sharpness of or manual stimuli from their condition. The person is often more comfortable lying down and may have partial or full relief with a traction test maneuver to the painful region of the spine.
For these patients, use of traction procuders or unweighting for the body may be the interventions of choice until the symptoms stabilize.

Management of acute symptoms

Traction

-Traction has the mechanical benefit of temporarily separating the vertebrae, causing mechanical sliding of the facet joints in the spine, and increasing the size of the IV foramina. If done intermittently, this motion may help reduce circulatory congestion and relieve pressure on the dura, blood vessels, and nerve roots in the IV foramina. Improving circulation may help decrease the concentration of noxious chemical irritants due to swelling and inflammation.

-May be neurophysiological response via stimulation of the mechanoreceptors that may modulate the transmission of nociceptive stimuli at the spinal cord or brain stem level

Pool

Start with a buoyant life belt to reduce effects of gravity on the lumbar spine. If symptoms reduce, it may be possible to begin and progress gentle stabilization exercises. Exercise can be progressed by using the properties of water for resistance and stretching.

Progression

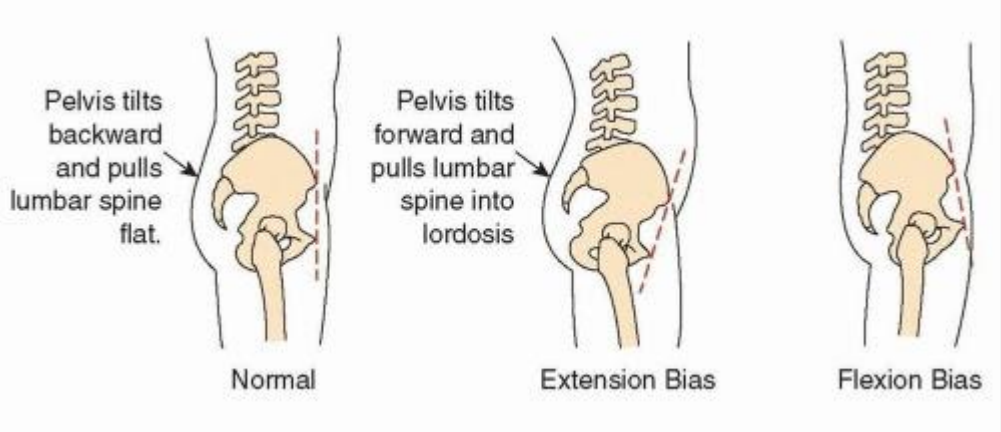
As healing occurs, the patient should begin to tolerate weight bearing. After re-examination and assessment, identify the impairments and activity and participation restrictions. If a bias toward flexion or extension is determined, or if there are areas of hypermobility or hypomobility, plan the interventions accordingly.

Management guidelines: extension bias

Patients often assume a flexed posture or flexed posture with lateral deviation of trunk or neck, during the exam, sustained or repetitive extension maneuvers reduce or relieve symptoms. These patients benefit from early interventions that emphasize extension of the involved segments. Impairments may be due to a contained IV disc lesion, fluid stasis, a flexion injury, or muscle imbalances from a faulty flexed posture.

McKenzie developed a method of categorizing these patients based on the extent of their pain/ neurological symptoms. He also described the phenomena of peripheralization and centralization that accompany an expanding and receding lesion, frequently attributed to IV disc lesion.

Use the techniques previously described to manage acute disc lesions.



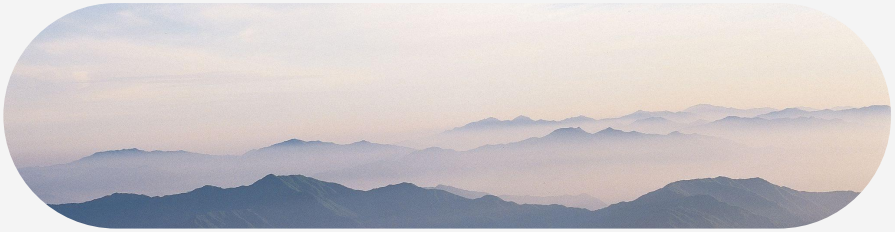
Principles of management

Signs and symptoms of bulging discs often fit into the extension bias
Relative changes in posture and activities affect intradiscal pressure. Pressure is at its least with lying supine and increases 50% while sitting with hips and knees flexed. It almost doubles from that when leaning forward while sitting. Lumbar support of 5cm and a back inclination of 120 provides the lowest load while sitting.
Lying down reduces the compression on the discs. With time the nucleus can absorb more pressure to equalize the pressure. When lying down the fluid moves to the posterior of the disc (more space) after rising the body weight compresses the disc. This increases the intradiscal pressure. Pain is accentuated.
Absolute bed rest during the acute phase should be avoided. Bed rest during the first 2 days may be needed to promote early healing. Make sure to intersperse with short activities like standing, walking, and appropriate movement.

Principles continued

Traction may relieve symptoms from protrusion (conflicting evidence on general evidence). If traction relieves pressure the application must be short. With reduced pressure fluid imbibition may occur to equalize the pressure. Then, when traction is released, the pressure increases and the symptoms are exacerbated.
Rest in a slightly forward-bent position often lessens the pain. Patient may deviate laterally to minimize pressure on the nerve root.
Movement into extension initially causes increased symptoms. With acute disc lesions in which there is protective lateral shifting and lumbar flexion techniques that cause ;lateral shifting to the opposite side followed by passive extension have been found to help clinical symptoms. Patients experiencing pain due to sustained flexed position experience relief with extension.
Isometric activities amd active back flexion or extension must be avoided during acute stage of disc lesion. Strong muscle contractions can also aggravate symptoms if a muscle has been injured. Avoid resisted extension exercises during acute stage.
Reflex muscle guarding or splinting often accompanies an acute disc lesion and adds to the compressive forces on the disc. Modalities and gentle oscillatory traction to the spine may decrease the splinting.

Indications, precautions, and CI's for interventions: extension approach



Indications… extension is used if pain and/or neurological symptoms decrease during repeated extension testing maneuvers and worsen during flexion. Also indicated for flexed postural dysfunctions with decreased range into extension. IF NO TESTING DECREASES SYMPTOMS DO NOT USE.
Precaution…. A patient with acute pain in the spinal region that is not influenced by changing the patient's position or by movement must be screened by a physician for signs of a serious pathology
CI's… when there is an acute disc lesion, any form of exercise or activity that increases pressure (valsalva, active trunk flexion, or trunk rotation) ci'd during protection phase. Any movement that worsens the symptoms signals a movement that is ci'd during acute and early subacute period. Worsening with extension motions may indicate stenosis, a large lateral disc protrusion, or pathology in posterior element. Box 15.9 pg 462

Interventions using an extension approach in the L/S pg 462

**Follow along in text book

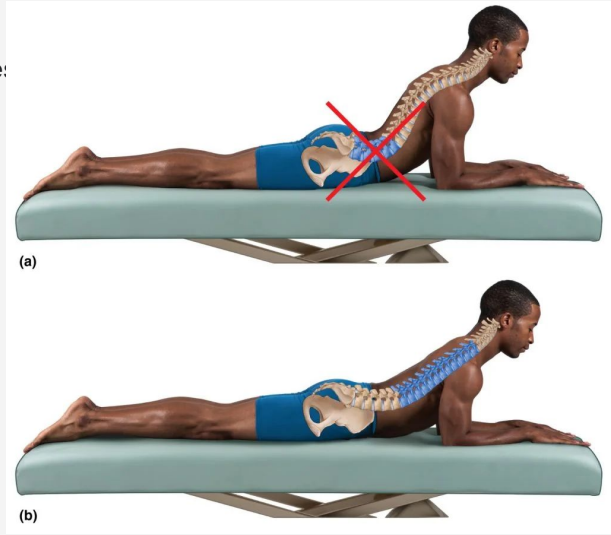
Managing **acute** symptoms

Is symptoms are severe, bed rest with short periods of walking in regular intervals. Use crutches or walker if needed.

If repeated flexion worsens and repeated extension decreases symptoms avoid all flexion activities.

Treatment begins with

- Extension
- Lateral shift
- Patient education
- Lumbar traction
- Kinesthetic training, stabilization and basic functional activities



Management when acute symptoms have stabilized

Signs of improvement
Loss of spinal deformity, increased motion, and negative dural mobility signs
Loss of back pain with an increase in true neurological signs is and indication of worsening.
Test the patient with flexion and extension tests (stand, supine, then prone). The tests may be positive for structural impairments (restricted motion, weakness and tension), but should not cause worsening of symptoms.
Intervention
Recovery of function, development of healthy back care plan, and teaching the patient how to prevent recurrences.
The pain from adaptive shortening decreases as normal flexebility, neural mobility, strength, and endurance are restored. In addition to general exercise instruction, teach these principles

- Following any flexion exercises perform extension exercises
- If being in prolonged flexion is necessary, interrupt with bending backwards at least 1/ hr. Perform intermittent pelvic tilt very hour throughout the day.
- If symptoms of protussion develop and are felt, immediately perform press up in prone position, anterior pelvic tilts in quadruped position, or backward bending while standing to prevent progression of symptoms.

Interventions to manage a disc lesion in c/s

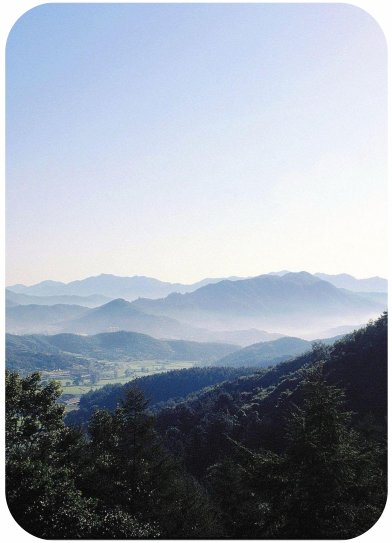
Pg 465
Less common in the c/s than the l/s. Herniated disc are most common between the c6 and c7 vertebrae; likely due to the increased mobility at this transitional section between the c/s lordosis and the t/s kyphosis. May also be the result of degeneration, osteophytes, or poor posture. May present with peripheral neuropathy and FHP without a diagnosis of disc pathology.
Symptoms worsen with activity and increased flexion in the lower c/s and upper t/s and decrease with extension there.

Conservative management is similar to the l/s and follows the same principles.

Progression as symptoms stabilize
Box 15.7
Faulty cervical, thoracic, and scapular posture may be present. Emphasize kinesthetic training for postural awareness, stabilization exercises for postural control with emphasis on the scapular and shoulder muscles, environmental adaptations to reduce postural stresses, and functional activities with safe spinal mechanics.

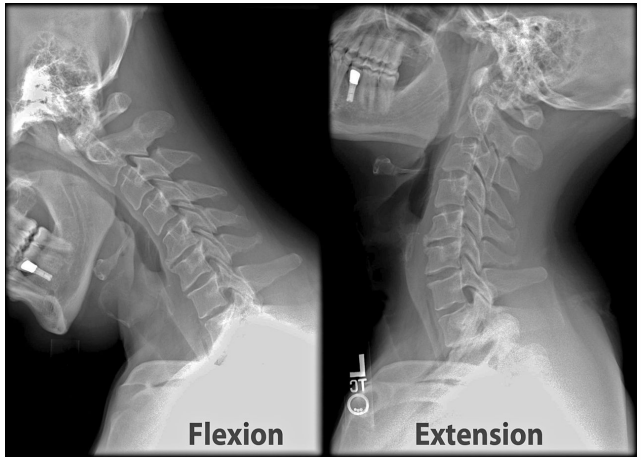
Acute phase

- Passive axial extension (cervical retraction)
- Patient education
- Traction
- Kinesthetic training for posture correction



Read disc lesion: surgery and postop management not on exam

Management guidelines: flexion bias



Patient may present with flexed posture and be unable to extend because of increased neurological symptoms and decreased mobility. May have a medical diagnosis of spondylosis or spinal stenosis, an extension load injury, or capsular impingement or swollen facet joints, so symptoms increase with extension. Flexed position reduces or relieves symptoms.

Principles of management pg 468

Focus is on increasing the diameter of the foramen and minimizing nerve root irritation.

Effect of position: flexion widens the IV foramina, extension decrease the size. Encroachment from bony spurs or lipping or swollen tissue, reduces the space.

Effect of tration: traction has been demonstrated to widen the IV foramina

Effect of trauma and repetitive irritation: swelling in the facet joints from marco or micro trauma leads to compromised foraminal space

Effect of meniscoid tissue: the meniscoid tissue of the joint capsule may become impinged with sudden movements. This blocks specific motions (extension and sidebending) to the involved side

Indications and CI's for intervention: flexion approach

Indications:
If neurological and/or pain symptoms are eased with flexion and worsened with extension positions or motions

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Contraindications:
Extension and extension with rotation positions, motions,and exercises are ci'd if neuro symptoms or pain worsen.
Flexion exercises are ci'd if neuro symptoms increase or peripheralize with flexion or repeated flexion

Techniques utilizing a flexion approach

In general, spinal flexion posture and exercise guidelines are seen in boxes 15.5, 15.7, and 15.8. The following should be considered for special conditions.

Pg 468

Management of acute symptoms

- Patient education
- Functional position for comfort
- Traction
- Correction of lateral shift
- Correction of meniscoid impingement

Management when acute symptoms have stabilized

- Hypomobile joints require stretching but not if the techniques stress a hypermobile region. Traction techniques may be effective.
- Strength and flexibility of the trunk, hip, and shoulder girdle musculature require selective stretching and strengthening.
- If there are bony changes or osteophytic spurs, the patient should avoid postures and activities of hyperextension. Adaptations in the environment might be necessary.
- For patients with RA, emphasis is on stabilization and control

Management guidelines: stabilization

Patients with segmental instability (hypermobility, ligamentous laxity, and diagnoses such as spondylolysis, spondylolisthesis, or poor neuromuscular control of deep segmental and global stabilizing musculature) require interventions that improve stability. Mobility testing of the spinal segements reveals increased mobility in one or more segments. May have a decreased activity in the stabilizing musculature, particularly in response to postural disturbance, there may be faulty respiratory patterns.
Read “identification of clinical instability” pg 469

Principles of management

Passive support
Not usually recommended but may be supportively necessary to reduce pain and provide stability.
Deep segmental muscle activation
Biofeedback pressure cuff or ultrasound are used to instruct patients to activate the segments. Once the patient has learned to activate the segmental muscles, emphasis is placed on sustaining the contraction over a period of time and on increasing the reps of the static hold to reinforce the postural function. These are of low intensity to minimize the compressive activity of the global muscles.

Lumbar region
Patient is taught to find and maintain a neutral spine position using pelvic tilts (midrange). Patient is then instructed in the “drawing maneuver” to activate the TrA (transverse abdominis), then to contract the multifidus by bulging out the stomach. Gentle co-activation of the muscles of the perineum facilitates contraction of segmental muscles.
Cervical region
Patient is taught to activate the segmental musculature with gentle capital nodding and slight flattening of the cervical lordosis.

Progression of stabilization exercises
- Progress for segmental muscle activation to general stabilization exercises using global musculature to emphasize cervical and pelvic control while superimposing extremity motions. (wall slides, partial lunges and partial squats) emphasize drawing in and spinal control in neutral spine while doing activities.
- Incorporate functional activities into stabilization exercise routine.

Management guidelines

Soft tissue injuries

Symptoms in soft tissue, including muscle, can occur as a result of direct rauma, strains from sustained or repetitive activities, or as protective mechanism from injury to joints or other tissue. In addition to boxes 15.5, 15.7 and 15.8 the specifics to treating are in this section.

Acute phase;

Pain and inflammation control- use appropriate modalities and myofascial release techniques

Muscle function-identify the functional positions in which the patient has a decrease in symptom intensity. Read 472 cervical and lumbar

Traction- gentle oscillating traction may reflexively inhibit the pain and help maintain synovial fluid and joint play motion during the acute stage

Environmental adaptations- identify the mechanism and modify the activity or environment to eliminate the potential of recurrence of the problem.

Subacute and chronic

Re-examine patient and determine the impairments and activity limitations.

Management of regional diagnoses

Read 473-483

The spine: exercise and manipulation interventions

Chapter 16 pg 491

Read pg 492-497

Cervical and upper thoracic region: stretching techniques pg 497

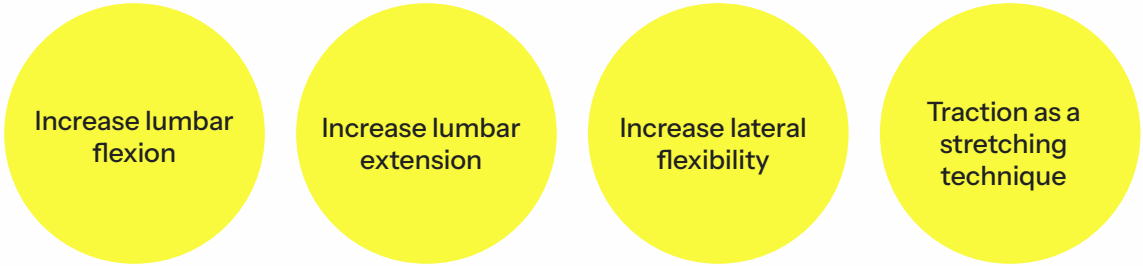
Increase thoracic extension

Increase cervical retraction: scalene stretch

Increase upper cervical flexion: subocc stretch

Traction as stretching

Mid and lower thoracic and lumbar regions: stretching techniques pg 503



Stabilization training: fundamentals techniques and progressions

Read 513-515

Group read 516-528

Isometric and dynamic exercises

Isometric exercises may be called stabilizing exercises, as there is little or no movement of the spinal segment. Dynamic exercises with spinal movement are introduced into the exercise program when the patient demonstrates effective segmental and global stabilization techniques and has developed endurance in the stabilizing musculature. Dynamic exercises should not be a substitute for stabilization exercises.

Exercises for the cervical region

Page 529
Isometric exercises: self resistance
Isometric resistance activities
Dynamic cervical flexion
Manual resistance: cervical muscles
Intermediate and advance training

- Transitional stabilization for the cervical and upper thoracic regions
- Functional exercises

Exercises for the thoracic and lumbar regions

Page 530
Alternating isometric contractions and rhythmic stabilization
Isometric and dynamic strengthening: abdominal muscles
- Trunk flexion (abdominals): supine
- Trunk flexion (abdominals): sitting or standing
- Trunk flexion (abdominals): prone

Isometric and dynamic strengthening: erector spinae and multifidus muscles
- Extension exercises in prone or quadruped position
- Extension exercises sitting or standing

Trunk side bending (lateral abdominus, erector spinae, QL)

Common aerobic exercise and effects on the spine

Page 536
Cycling
Walking and running
Stair climbing
Cross-country skiing and ski machines
Swimming
Upper body ergometers
Step aerobics and aerobic dancing
Crossfit
“Latest popular craze”

Cycling

Road bikes place the thoracolumbar spine in flexion and the upper cervical spine in hyperextension. Use this exercise for patients who have a flexion bias in the lumbar region so long as there is no upper cervical symptoms. Modifications include using a bike that positions the body in a more upright posture, such as a mountain bike or hybrid. Many stationary bikes also position the individual in upright position therefore are less likely to precipitate cervical problems

Walking and running

The upright posture emphasizes normal spinal curves, and lumbar extension is emphasized with walking and running. Emphasize the importance of identifying the neutral spine, activating the drawing-in maneuver, and stabilizing the spine while walking or running. Because conscious control is not possible during the entire exercise time , coach the patient to check his or her posture and muscle control frequently. Running is a high impact activity and may not be tolerated by individuals with intervertebral disc lesions or degenerative joint conditions.

Stair climbing

Commercial devices that replicate stepping with various grades of resistance are used for strengthening and aerobic conditioning. Regular steps can also be used for aerobic for aerobic conditioning. This activity requires pelvic control of the reciprocating lower extremities, because lifting the leg on one side emphasizes spinal flexion while contralateral lower extremity and spine are extending. Coach the patient to maintain the neutral spine with the stabilizing muscles against the rotational forces.

Cross -country skiing and skiing machines

Cross-country skiing, whether out in the cold or on a commercial machine,is a high-intensity aerobic activity. The kicking motion that accompanies the backward motion of the leg emphasizes spinal extension. It is important to coach the patient to maintain the neutral spine and contract the stabilizing abdominal muscles.

Swimming

Breast stroke- emphasizes extensionin the cervical and lumbar spinal regions when taking a breath. Coach the patient not to extend the neck full range but to keep it in neutral and lift the head out the water as a “solid” unit with the thorax just enough to clear the mouth for breath.
Freestyle- May exacerbate cervical problems because of the repetitive cervical rotation while taking a breath; this stroke also emphasizes lumbar extension with the flutter kick. Teach the patient to breathe using a “log-roll”technique in which the whole body rolls toward one side while breathing and then rolls back to the face-down position for the stroke. The requires good spinel stabilization.
Backstroke- emphasizes spinal extension via kicking the lower extremities and the arm motions.
Butterfly stroke- moves through the spine through a full ROM; emphasis is placed on controlling the range with the stabilizing muscles.

Upper body ergometers

Ergometry machines provide upper extremity resistance and can also be used for aerobic training. Forward motions emphasize spinal flexion and shoulder girdle protraction; backward motions emphasize spinal extension and shoulder girdle retraction. Coach the patient to assume the neutral spinal posture and use the stabilizing muscles prior to and during the use of the machines. Progress to standing if available.

Step aerobics and aerobic dancing

Similar to using stairs or a stair machine except for the jumping and bouncing that is usually added to the more advanced programs.
Dancing moves may take on many forms, and classes are taught that address various fitness levels and ages. If possible, review safe movement patterns and help the patient recognize safe limits.

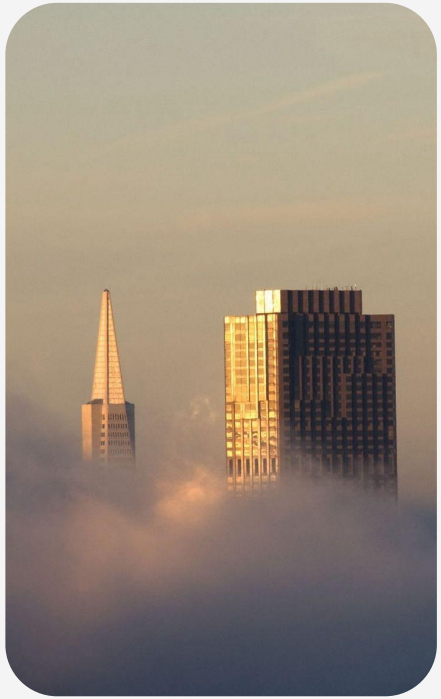
Cross fit

This high intensity and variable strength training program has become increasingly popular. It has an injury rate of 3.1 per 1000 hours of training. Similar to olympic sports like weight lifting and gymnastics. As with all exercise programs, it is important to provide proper instruction for safe use and application of each exercise.

Latest popular craze

People like variety and may be attracted to charismatic and energetic figures who demonstrate “new” workout techniques and routines or new machines. Patients may as for advice. Knowledge and skill in analyzing the biomechanics of the activity and forces that are imposed through the spine should be used to provide advice about exercise safety.

Early functional training: fundamental techniques








This teaches basic maneuvers for ADL

Rolling
Supine to sitting/sitting to lying down
Sit to stand/stand to sit
In and out of a car
walking

Preparation for functional activities: Basic exercise technique

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Once the patient has learned to manage their symptoms and th symptoms of inflammation diminish, exercises are initiated that prepare the extremities and trunk for functional activities. The patient should be able to perform ADLs by this point.

Weight-bearing exercises

*modified bridging exercises
*push-ups with trunk stabilization
*wall slides
*partial lunges, squats and steps
*walking against resistance

Transitional stabilization

*quadruped forward/backward shifting
*squatting and reaching
*shifting weight and turning

Body mechanics and environmental adaptations

Principles of body mechanics: instruction and training

It is advisable not to overwhelm the patient with too many instructions. Initiate training by suggesting the pt find neutral spine, performing drawing in maneuver, and then lift. Observe and modify.

Lumbar spine position pg 541

Spinal flexion

Spinal extension

Load position

Environmental adaptations

Ergonomic assessment and modification for work and home are necessary to correct stresses and prevent future recurrence.

Home, work, and driving

Chairs and seats with proper lumbar support

Chair height- knees flexed, thighs supported, feet flat on floor

Arm rests used for prolonged sitting

Desk or table height adequate to prevent pt from leaning over the work

Work and driving habits follow frequent changing of posture (walk every hour minimum)

Sleeping environment

Mattress need to provide firm support keeping the spine in line

Pillows should be a comfortable height promotes relation but keeps joints in alignment

Intermediate to advanced exercise

Pg 542
Reps are increased to develop muscular endurance, and resistance is added to develop strength.

Repetitive lifting
Repetitive reaching
Repetitive pushing and pulling
Rotation or turning
Transitional movements
Transfer of training

The end

Read Patient education for prevention pg 542-543

Complete and email the independent learning activities pg 543 **due next class**