

## Lumbar Stenosis

### Rehabilitation Using the Resistance Chair

#### a. Description

Lumbar spinal stenosis is a term used to describe a narrowing of the spinal canal. The narrowing leads to compression of the nerves supplying the legs and back, leading to pain. It is thought to be primarily caused by age-related degenerative changes and is recognized as a common disability in the older adult population. Poor posture and weak core musculature can contribute to symptoms. Exercises to stretch the lower back region and strengthen the muscles which support the spine can reduce the compression of the spinal nerves. Symptoms of central spinal stenosis are usually worse when a person is standing or walking and better when sitting. Therefore, the Resistance Chair is the perfect rehabilitation and exercise tool for patients with lumbar stenosis.

#### b. Symptoms

People affected by this condition usually describe pain radiating from the low back or buttocks into both legs. Standing or walking for prolonged periods of time often exacerbates this condition while sitting or lying down usually relieves this pain. Often, patients report relief of symptoms with forward bending or leaning over something such as a shopping cart.

#### c. Diagnosis

The diagnosis of lumbar spinal stenosis requires the presence of typical symptoms as described above along with special imaging studies such as an MRI showing structural narrowing of the spinal canal. Electrodiagnostic studies may also be considered to assess possible nerve root damage.

#### d. Management

Management of lumbar spinal stenosis may involve nonsteroidal anti-inflammatory drugs (such as Ibuprofen) and pain medications, therapy modalities (heat, cold, electrical stimulation, ultrasound), and a specific rehabilitation program. Some patients who do not respond to conservative treatment may be candidates for a steroid injection (epidural) or may require surgical evaluation. A majority of patients do show considerable improvement with an exercise based rehabilitation program.

## e. The Resistance Chair Solution

Aerobic conditioning, specific strengthening and stretching exercises are mainstays of conservative treatment for lumbar stenosis (1). One recent study showed patients with stenosis treated with an exercise program achieved significant improvements by 6 weeks (2). The goals of conditioning are increased muscular stabilization (especially in abdominal musculature) and improvement of posture. Other specific types of exercises such as bicycling may also help to relieve symptoms of spinal stenosis. The Resistance Chair Solution addresses all these factors by incorporating a focused exercise program and stationary bicycling for the management of lumbar spinal stenosis. The following are specific exercises to improve mobility and strength of the lower back and trunk in order to reduce the symptoms of lumbar stenosis. The Solution also enables patients with lumbar stenosis to improve upper and lower body strength and endurance in sitting without exacerbating symptoms of lumbar stenosis which are usually worse with standing and walking.

### References:

1. Rittenberg, JD, Ross, AE. Functional rehabilitation for degenerative lumbar stenosis. *Physical Medicine and Rehabilitation Clinics of North America* 2003; 14: p 111.
2. Whitman, Julie M. et al. A Comparison Between Two Physical Therapy Treatment Programs for Patients With Lumbar Spinal Stenosis: A Randomized Clinical Trial. *Spine* 2006; 31(22), pp 2541-2549.
3. Simotas, Alexander C. et al. Nonoperative Treatment for Lumbar Spinal Stenosis: Clinical and Outcome Results and a 3-Year Survivorship Analysis. *Spine* 2000; 25(2), p 197.

### Trunk Flexion Stretch

Goal: To stretch the muscles of the lower back.

1. Begin sitting upright in chair. Round your back as you bend forward to reach your chest towards your thighs. (Figure A)
2. Contract your abdominal muscles as you roll back up to starting position.
3. Hold position for 20 seconds. Repeat 3 times.

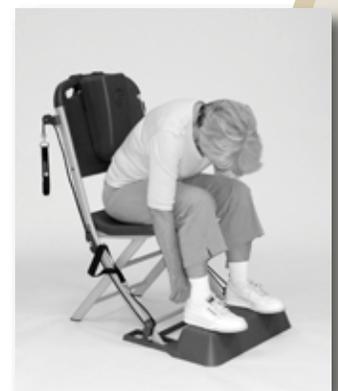


Figure A

## Abdominal Curls

Goal: To improve abdominal strength.

1. Sit upright in chair.
2. With upper pulleys extended over your shoulders, interlock your fingers in front of your chest by pulling the two handles together. (Figure A)
3. Contract abdominal muscles as you bend forward at the waist as far as comfortably possible while rounding your back. (Figure B)
4. Slowly return to starting position.
5. Repeat 10 times and perform 2 sets.

Technique key – Make sure that while rounding your back the abdominal muscles are pulling inward, not pushing outward.



Figure A



Figure B

## Chair Squats

Goal: To improve leg strength and ability to get in/out of chair.

1. Sit toward front of chair with hands on thighs, feet firmly on floor. (Figure A)
2. Lean forward, transferring weight to legs as you lift your bottom off the chair. (Figure B).
3. Slowly return to seated position.
4. Repeat 10 times and perform 2 sets.

Technique key – Practice holding position at stable, comfortable heights.



Figure A

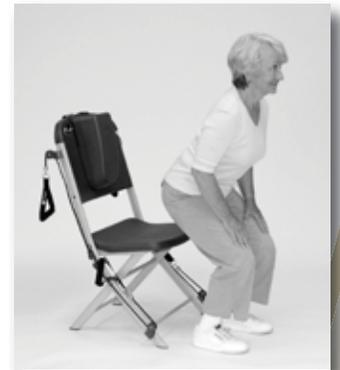


Figure B

## Trunk Twist Stretch

Goal: To increase range of motion of back.

1. Sit up tall while facing sideways in chair.
2. Twist right and grasp back of chair with hands (Figure A).
3. Hold position 20 seconds while continuing to breath.
4. Repeat 2 times on each side.

Technique key – To increase stretch: Cross left leg over right while stretching to the left and right leg over left while stretching to the right. (Figure B).



Figure A

### Oblique Strengthening

Goal: To improve trunk strength.

1. Sit on side of chair as shown.
2. Grasp upper cable handle and hold in front of sternum with both hands (Fig. A).
3. Sit tall while twisting from your waist away from the pulley anchor. Keep weight evenly distributed between right and left buttocks as you twist (Fig. B).
4. Slowly return to starting position.
5. Repeat 10 times and perform 2 sets.

Technique key – Maintain pulleys directly in front of sternum throughout twist.



Figure A



Figure B

### Hamstring Stretch with Sciatic Nerve Glide

Goal: To stretch back of leg and increase mobility of sciatic nerve.

1. Sit tall in chair.
2. Extend one leg out as straight as you can without increasing lower back pain. (Figure A)
3. Point and flex ankle 10 times in each direction while keeping your leg extended. (Figure B)
4. Repeat 2 times each side.

Technique key – Point and flex from ankle, not toes.



Figure A



Figure B

### Quadriceps Stretch

Goal: To stretch the front of thigh.

1. Stand at right side of chair. Face away from chair and hold back of chair for balance
2. Place right foot on chair seat as shown (Figure A).
3. Squeeze buttocks and abdominals to tuck pelvis under. Keep thighs together. Feel stretch in front of thigh.
4. Repeat 2 times each side.
5. Hold stretch for at least 20 seconds. Recommend holding for 60-90 seconds, if possible.

Technique key – Keep thighs together.



Figure A

### Hip Flexor Stretch

Goal: To increase flexibility of hips and decrease strain to lower back.

1. Sit sideways on the chair with one knee on the Health Step and opposite arm holding the back of chair for support. (Figure A)
2. Squeeze buttock to feel a stretch in front of your kneeling hip.
3. Hold stretch for at least 20 seconds each side. Recommend holding for 60-90 seconds if possible.
4. Repeat 2 times each side.

Technique key – Maintain most of weight on chair and pad under knee if needed. Stretch knee behind you to increase stretch in front of thigh.



Figure A

### Hip Flexor Stretch - Alternate Technique

1. Stand facing back of chair with hands on Balance Bar for support.
2. Step one foot backwards approximately 12 inches.
3. Maintaining upright posture, tuck pelvis under while squeezing buttock muscles to feel a stretch in front of your hip (Figure A).
4. To increase stretch gently lunge weight forward onto front leg.



Figure A

Symptoms of lumbar stenosis are usually exacerbated with standing or walking. The Resistance Chair offers these patients an excellent way to condition their bodies while sitting without pain. The following are some suggested upper body exercises.

## Additional Upper Body Exercises

### Chest Press

Goal: To improve strength of chest and shoulder muscles

1. Sit in chair.
2. Grasp upper cables at chest level. (Fig. A)
3. Push arms forward, return slowly. (Fig. B)
4. Repeat 10 times and perform 2 sets

Technique key – Keep wrists straight throughout exercise and shoulders relaxed, away from ears.



Figure A

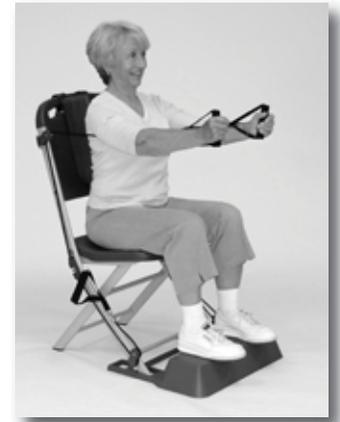


Figure B

### Forward Raises

Goal: To increase strength of front of shoulders.

1. Sit in chair.
2. Grasp lower cables in each hand as shown. (Figure A)
3. With thumbs pointing upward, palms facing inward, raise both arms in front to shoulder level, lower slowly. (Figure B)
4. Repeat 10 times and perform 2 sets.

Technique key – Maintain shoulders relaxed, down away from ears, as you raise your arms. Keep wrists straight. Exhale as you raise arms inhale as you lower arms.



Figure A

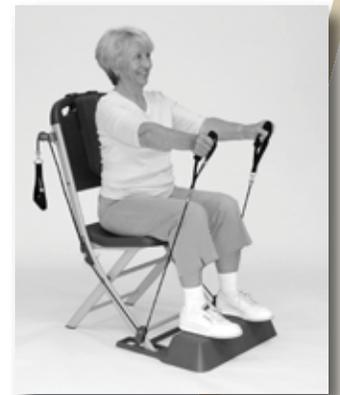


Figure B

## Side Raises

Goal: To increase strength of sides of shoulders.

1. Sit in chair.
2. Grasp lower cables in each hand. (Fig. A)
3. Raise both arms out to side as shown. Lower slowly. (Fig. B)
4. Repeat 10 times and perform 2 sets.

\*Caution: Do not raise higher than shoulder level.

Technique key – Maintain shoulders relaxed down away from ears as you raise your arms. Keep wrists straight. Exhale as you raise arms, inhale as you lower arms.



Figure A



Figure B

## Combined Forward/Side Raises

Goal: To increase strength of rotator cuff and shoulders.

1. Sit in chair.
2. Grasp lower cables in each hand. (Fig. A)
3. With thumbs pointing upward, palms facing together raise arms to shoulder level as shown. Lower slowly. (Fig. B)
3. Repeat 10 times and perform 2 sets.

Technique key – Maintain shoulders relaxed down away from ears as you raise your arms. Keep wrists straight. Exhale as you raise arms, inhale as you lower arms.



Figure A



Figure B

## Bent-Over Reverse Flys

Goal: To strengthen upper back muscles for posture and shoulder alignment.

1. Sit in Chair, fold forward so chest rests on thighs, hands reach toward floor. (Fig. A)
2. Squeeze shoulder blades together as you raise arms out to the sides.
3. Hold 5 seconds. (Fig. B)
4. Relax arms to floor.
5. Repeat 12 times.

Technique key – Look down to maintain neutral position of your neck (neck straight).



Figure A

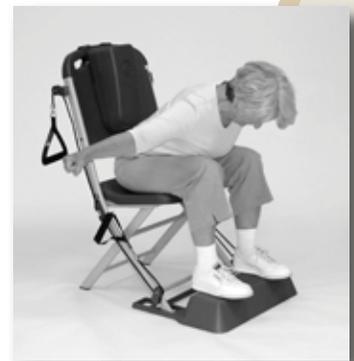


Figure B

## Bicep Curl

Goal: To increase strength of front of arms.

1. Sit in chair.
2. Grasp lower cables in each hand, palms facing forward. (Fig. A)
3. Bend elbows and slowly straighten. (Fig. B)
4. Repeat 10 times and perform 2 sets.

Technique key – Keep shoulders stable as you bend elbows.



Figure A

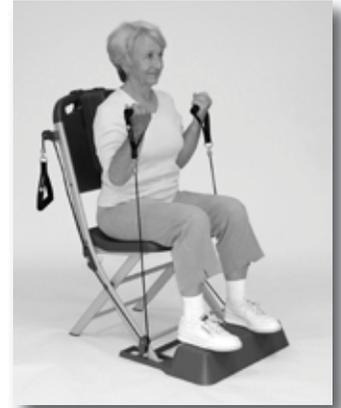


Figure B

## Tricep Pulldown

Goal: To increase strength of back of arms.

1. Sit in chair.
2. Grasp overhead cables and pull down to starting position as shown; elbows at sides and bent to 90 degrees. (Fig. A)
3. Push cables down to sides to straighten arms. (Fig. B)
4. Slowly bend elbows to 90 degrees.
5. Repeat 10 times and perform 2 sets.

Technique key: Keep elbows close to sides of ribs (or sides of body), and keep wrists straight.

Technique key – Keep elbows close to sides of body.



Figure A

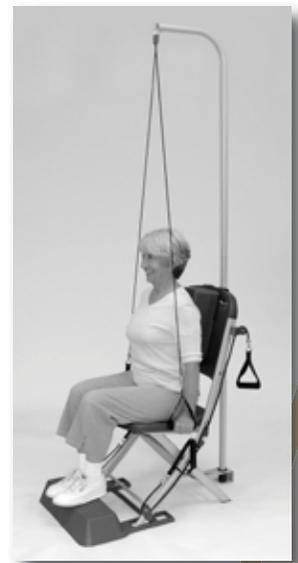


Figure B

## Advanced Upper Body Exercises

### Bent Over Reverse Flys with Pulleys

Goal: To Strengthen upper back muscles for posture and shoulder alignment.

1. Sit in Chair, fold forward so chest rests on thighs, hands grasp lower pulleys. (Fig. A)
2. Squeeze shoulder blades together as you raise pulleys out to the sides. (Fig. B)
3. Hold 5 seconds.
4. Relax arms to floor.
5. Repeat 12 times and perform 2 sets.

Technique key – Look down to maintain neutral position of your neck (neck straight).



Figure A



Figure B

### Bent-Over Row (One Arm Row)

Goal: Strengthen upper back and shoulder muscles.

1. Begin exercise by bending over and supporting yourself with one hand and one knee on the chair seat.
2. Grasp the lower cable with your arm reaching down straight. (Figure A)
3. Pull the cable straight up so that your hand ends up near your chest with your elbow bent and pointing upwards as shown. (Figure B)
4. Repeat 12 times; perform 2 sets each arm.

Technique Key: Keep your abdominals contracted as you perform the exercise and look down to maintain neutral position of your neck (neck straight).



Figure A

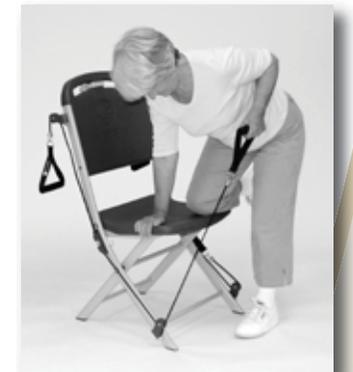


Figure B

## Exercises with the Freedom Flex

### Abdominal Crunches

Goal: To increase abdominal and core strength.

1. Position the Saddle Hook so that the resistance cables are within arms reach while you are sitting in the chair.
2. Grasp the overhead resistance cables in each hand. (Figure A)
3. Pull the cables as you curl forward from your waist and tighten your abdominal muscles. Exhale during this phase of the exercise. (Figure B) The handles remain in front of your forehead throughout the exercise.
4. Inhale as you release the contraction and return to the upright sitting position.
5. Repeat 12 times.

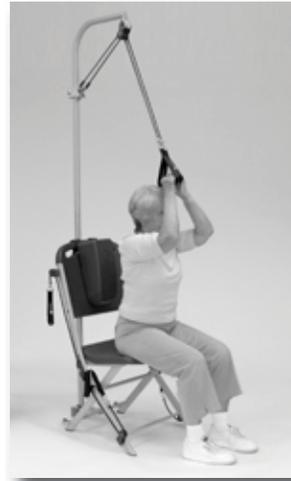


Figure A



Figure B

### Abdominal Crunch with Single Leg Lift

Goal: To increase abdominal and core strength.

1. Position the Saddle Hook so that the resistance cables are within arms reach while you are sitting in the chair.
2. Grasp the overhead resistance cables in each hand. (Figure A)
3. Simultaneously lift your left knee as you pull the cables and curl forward from your waist. Tighten your abdominal muscles and exhale during this phase of the exercise. (Figure B).
4. Inhale as you release the contraction, lowering your leg and returning to the upright sitting position.
5. Repeat 12 times with each leg.

Technique Key: Round your back as you curl forward.



Figure A

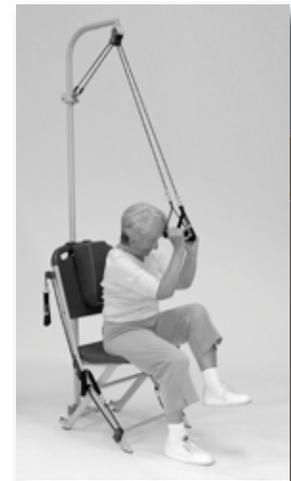


Figure B

## Latissimus Pulldown

Goal: To increase strength of back muscles.

1. Position the Saddle Hook so that the resistance cables are just within arms' reach while you are sitting in the chair with your arms extended above your head. (Figure A).
2. Sit tall as you pull the cables down towards your shoulders, elbows to the sides. (Figure B).
3. Slowly extend your arms upward to the starting position.
4. Repeat 12 times and perform 2 sets.



Figure A

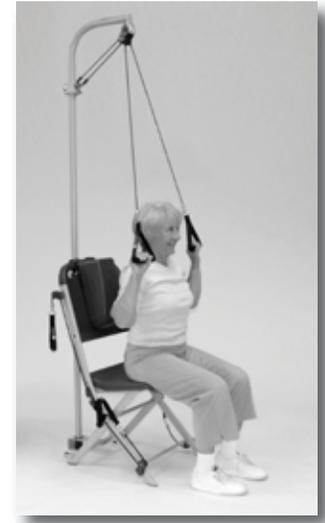


Figure B

## Front Pulldown

Goal: To increase strength of the back and arm muscles.

1. Position the Saddle Hook so that the resistance cables are just within arms' reach while you are sitting in the chair with your arms extended above your head. (Figure A).
2. With arms in front of you, elbows facing forward, palms facing you, pull cables toward your waist (Figure B).
3. Slowly extend arms toward the starting position.
4. Repeat 12 times and perform 2 sets.



Figure A

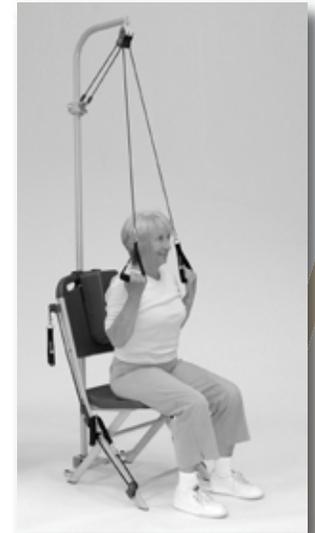


Figure B

## NOTES

- Engage abdominals with all exercises.
- Remember to breathe with each repetition.
- Start rehabilitation program slowly, only working through minimal discomfort levels. If pain increases, decrease resistance level and/or repetitions.
- Consult your physician if you experience increased pain, weakness, numbness, palpitations or severe shortness of breath.

**CAUTION:** Before beginning any exercise program please consult a healthcare provider for appropriate exercise instructions and safety precautions.

## LUMBAR STENOSIS PROFESSIONAL NOTES

1. Seat patient in chair. Use footrest if needed to stabilize patient.
2. Use posture support unless patient has long legs, as this will place them too far forward in chair.
3. Start with trunk flexion stretch to open vertebral canal and stretch posterior trunk muscles.
4. If the patient has moderate to severe osteoporosis, avoid excessive trunk flexion.
5. Seated abdominal curls are an excellent way to increase abdominal muscle strength without stressing the neck. Cue the patient to first contract the transversus abdominus muscle and to exhale and pull the belly in while curling forward. Make sure they are performing the movement by flexing the trunk, not by pulling the cables with their arms.
6. Chair squats: Instruct patient to sit toward the front of the chair with both feet firmly planted on the floor. Have the patient practice shifting their weight forward onto their feet while lifting their buttocks off of the seat. Make sure the patient maintains neutral lower extremity alignment with the knees pointing directly over the feet. For safety, cue the patient to feel the seat of the chair behind their legs prior to returning to the seated position.

7. Trunk Twist: Have the patient sit tall and maintain upright posture as they twist. Use caution or exclude this exercise if the patient has moderate to severe osteoporosis. If the patient has foraminal stenosis, avoid rotation if it reproduces radicular symptoms.
8. Oblique strengthening: This exercise is extremely effective when done properly. The movement is very small and is initiated by contraction of the oblique muscles. Make sure the movement comes from the trunk twisting and not from pulling with the arms. The cable handles should remain in front of the center of the patient's body throughout the movement.
9. Hamstring Stretch with Sciatic Nerve Glide: Exclude this exercise if it elicits lower back pain, numbness or tingling.
10. Quadriceps and Hip flexor stretches: Tight rectus femoris and iliopsoas muscles cause increased lumbar lordosis and anterior pelvic tilt. Therefore, stretching these muscles is an effective way to reduce the lumbar extension moment to the spine. Cue the patient to focus on performing a posterior pelvic tilt in the stretching position. If these muscles are very tight such that the patient is unable to attain neutral pelvic position, this stretch may be too difficult for the patient to perform without aggravating symptoms of lumbar stenosis.
11. Additional Upper Body Exercises: Many patients with lumbar stenosis have limited tolerance to standing and walking. Therefore, exercises in sitting are a safe and effective way for these patients to strengthen their upper body. Remove the Posture Prop back support if it puts the patient in too much extension. The Posture Prop is beneficial to assure improved scapulohumeral positioning for a safer upper body workout. Cue the patient to exhale upon exertion and to contract abdominal muscles for increased trunk support.