

# Rehabilitation for patients after lung transplantation with gastroesophageal reflux



## USING THE METHODOLOGY OF DYNAMIC NEUROMUSCULAR STABILIZATION

**Tereza Stehnová, Alena Kobesová**

Rehabilitation Prague School and the Department of Rehabilitation and Sports Medicine, Second Faculty of Medicine, Charles University and University Hospital Motol, Prague, Czech Republic

Gastroesophageal reflux (GER) is when stomach contents flow back into the esophagus. This occurs due to impaired esophageal sphincter function, which prevents the return of stomach contents into the esophagus. Gastro-esophageal reflux is common in the general popula-



tion. It can manifest as heartburn, difficulty swallowing, a feeling of a lump in the throat, chest pain, or a sour taste in the mouth. In patients after lung transplantation, gastroesophageal reflux increases the risk of pulmonary complications and may be associated with a decline in the function of the transplanted lungs.

In some patients, reflux may develop only after lung transplantation, even if they did not have the condition prior to the surgery. Some medications can suppress reflux symptoms but do not eliminate the backflow of stomach contents, and the underlying problem persists. As a result, patients may not experience heartburn or other symptoms, but the risk to their lungs remains.

The goal of rehabilitation is to improve the function of the esophageal sphincter through specific exercises, thereby preventing the return of stomach contents into the esophagus. When performed regularly, the following exercises can help reduce

the negative impacts of gastroesophageal reflux on lung function. It is advisable to perform the exercises daily according to the following description or as instructed by a physical therapist.

**REHABILITATION  
PRAGUE SCHOOL**



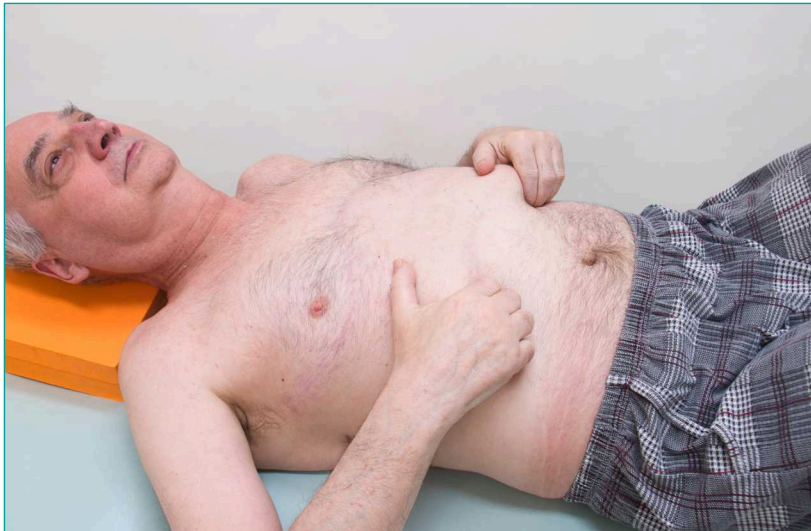
## Manual Release of the Chest and Scar

Before exercising, it is advisable to manually release the area of the chest, particularly the lower part and the surrounding scar.

Lie on your back, bend your legs, and support your head to avoid hyperextension. Place your hands at the lower edge of the chest, trying to insert your fingertips under the ribs. Gradually move your hands to the sides, and attempt to “massage” the space beneath the ribs with your fingers.

Perform the massage slowly. Apply gentle pressure to areas with greater resistance, holding it until the tense tissue relaxes. The pressure should not be painful. With a sufficiently long application of pressure (approximately 20-60 seconds), you should feel the resistance gradually release beneath your fingers. For more effective release of tense areas, you can warm them up beforehand, for example, by using heating pads placed on the lower rib area.

Work on the scar according to the instructions from the brochure “Scar Care” that you received after your surgery or as directed by your physical therapist. After the stitches are removed, the primary care for the scar includes gentle S-shaped stretching (in the shape of an S and C). Six weeks after surgery, you can also add longitudinal stretching of the scar. It is also advisable to regularly moisturize the scar with any fatty cream.



## Deepening and Calming the Breath

This exercise is designed to calm and slow down the breath, positively affecting the function of respiratory muscles. Lie on your back with your legs bent. Place your arms out to the sides. In this position, inhale slowly through your nose and exhale through open lips, ensuring that neither the inhale nor the exhale is audible. Focus on both the inhalation and exhalation phases. Breathe in this slow and smooth manner for at least one minute.



## Exercise with Lower Limbs Above the Mat

Lie on your back near a wall. Place a cushion under your head to keep it from tilting backward. Extend your arms to the sides, with palms facing up and fingers straight; try to press your fingernails lightly into the mat. Position your feet flat against the wall so your hips and knees are bent to approximately a 90-degree angle. Then, gently press your feet against the wall while keeping your fingers extended and fingernails in contact with the mat. Maintain the pressure against the wall for 5–10 seconds, then release. Remember to breathe freely throughout the exercise; do not hold your breath. You may also try lifting your feet slightly away from the wall for a moment, holding this position for 5–10 seconds while breathing freely. Keep your back from arching, with your lower back firmly pressed against the mat.



Another option is to perform the exercise with your legs resting on a chair. In this case, try to lift your legs slightly, raising them just above the chair. Keep your arms extended to the sides, palms facing up, and fingers extended, keeping contact with the mat. Hold this position for 5–10 seconds, then rest your legs back on the chair. During the exercise, avoid arching your lower back and remember to breathe freely without holding your breath. Repeat the exercise several times.

## Exercise Lying on the Side

Lie on your side with your legs slightly bent. Place a pillow or an exercise ball (small ball) between your knees. Position the lower elbow bent in front of your body while the upper elbow points toward the ceiling, with the hand resting on the side of your head.



Gently press the lower elbow and knee into the mat simultaneously. At the same time, try to reach upward with the upper elbow toward the ceiling, as if you're lifting the shoulder blade away from the spine. Keep your hand resting on your head without lifting it. Maintain light pressure from the lower elbow and knee into the mat while reaching with the upper elbow toward the ceiling. Hold this position for about 2 minutes. Breathe deeply during the exercise, and remember not to hold your breath.

## Trunk Stretch in Sitting Position

Sit on a chair with a backrest. Sit straight and try to lengthen your spine by reaching upward with your head. Place both hands behind your head and bring your elbows together. Lean back slightly over the chair's backrest and gently, rhythmically, rock backward for about 1 minute. Keep your elbows together throughout and continue reaching upward.



## Exercise with the Coach 2 Breathing Trainer

Incorporate exercises with the Coach 2 inspiratory trainer. Sit on a chair without a backrest, or turn the chair around so you can rest your entire back against a wall. Ensure your head is also supported; if resting against the wall tilts your head back, use a cushion to keep it aligned. Keep your head upright and in contact with the wall, and ensure your entire back remains in contact with it. During inhalation, avoid lifting your shoulders.



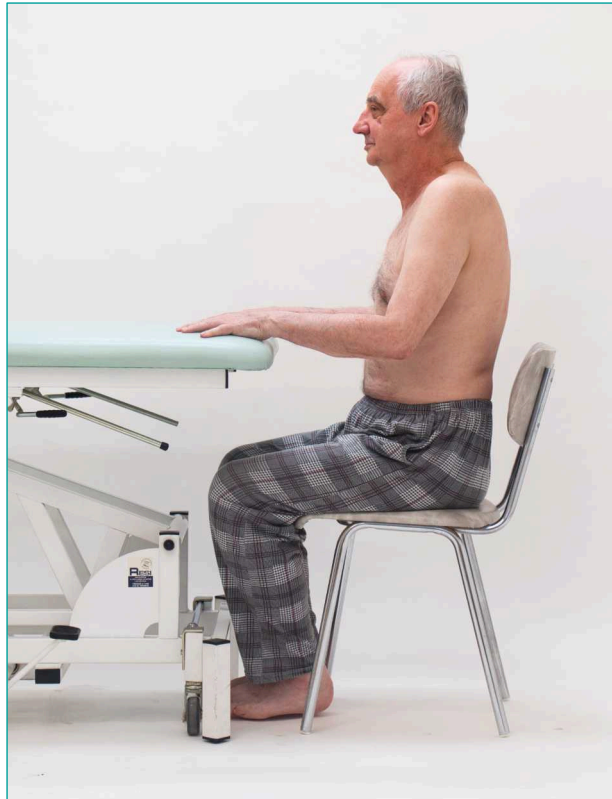
Continue using the Coach 2 trainer following the instructions provided by your physiotherapist, who will recommend the appropriate number of repetitions and depth of inhalation (volume of air). The core of the exercise is a smooth inhalation, during which the small yellow marker on the right should reach the level of the smiling face icon and stay there throughout the entire inhalation. You may also use the trainer in other positions, such as lying on your side or standing with support against a wall.





## Seated Exercise with Support on the Table

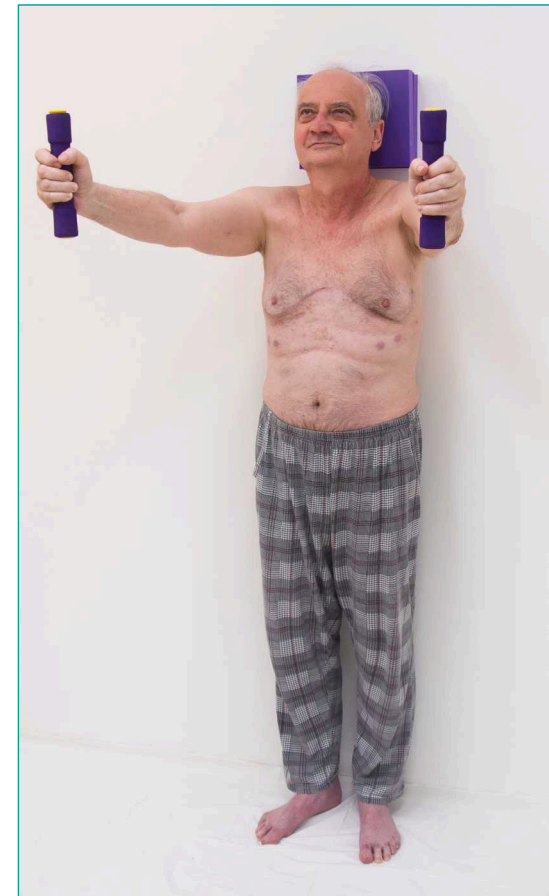
Sit on a chair at a table, sitting up straight. Place your palms on the table and apply light pressure downwards. Be careful not to lift your shoulders as you do this. While maintaining the pressure of your palms on the table, lift both legs slightly so your feet do not touch the floor. Keep your posture upright without arching your back. Try to hold this position for about 5–10 seconds, and remember to breathe continuously without holding your breath. Then, gently place your feet back on the floor. Repeat the exercise several times.



## Standing Exercise with Weights

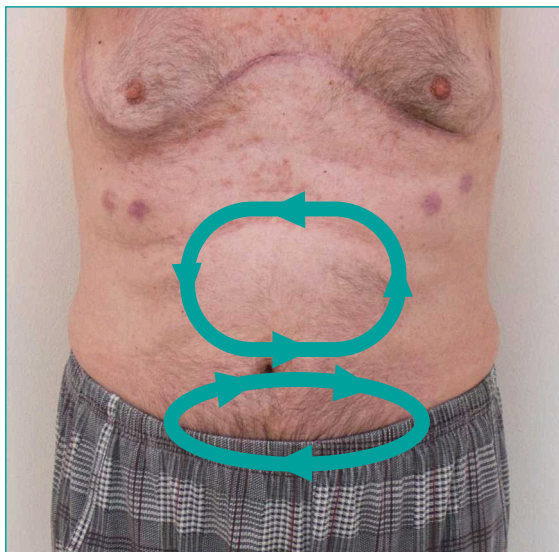
Take a light dumbbell or another weight, such as a water bottle (0.5 kg is sufficient to start), in each hand. Stand with your back against a wall, slightly bend your knees, and press your entire torso and head against the wall. If resting your head against the wall causes it to tilt backward, use a cushion to support it (similar to when lying on your back). Extend both arms forward, holding them in front of you.

Hold this position for about 1 minute while slowly straightening your knees. Keep your back and head in contact with the wall at all times. Maintain an upright posture – avoid arching your lower back, hunching forward, or tilting your head back. Breathe deeply and avoid holding your breath during the exercise.



## Manual Release of the Abdominal Area

It is beneficial to relax the abdominal area using specific circular movements. Place your hand on your abdomen and press with the flat of your palm. Maintain a broad, gentle, and painless pressure, and move your hand in a circular motion in the indicated direction, completing two “circles” (refer to the image for guidance).



Begin the first “circle” in the upper part of the abdomen, starting on the left just below the ribs, and move counterclockwise. Glide your hand under the ribs and return to the left side slightly below the navel.

For the second “circle”, move clockwise. Start in the lower right abdomen below the navel area and move upward above the navel, gradually circling to the left side.

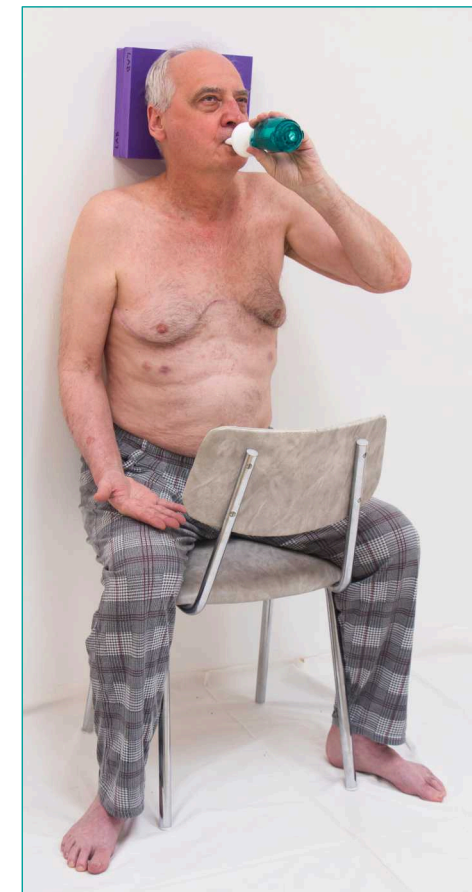
Repeat each “circle” slowly at least 10 times. Maintain consistent downward pressure with the palm into the abdominal cavity, ensuring the pressure is firm but not painful.



## Exercise with the Acapella Exhalation Trainer

Finish your session with the Acapella exhalation trainer. The basic position is seated against a wall with your head also supported (and cushioned if needed), similar to the position for the Coach 2 inspiratory trainer. Maintain this position throughout both inhalation and exhalation. You can also practice with Acapella in other positions, such as lying on your side or standing with support against a wall.

Follow the instructions provided by your physiotherapist, who will tailor the exercise parameters (repetitions, duration, and strength of exhalation) to suit your needs. The key to this exercise is a longer, smooth exhalation, during which you should hear the Acapella device “vibrate.”



# Online Video Library – Patient Section

**REHABILITATION PRAGUE SCHOOL**

- ▶ Home
- ▶ DNS App
- ▶ Online Video Library

**Online Video Library**  
- For patients section

**DNS FOR PATIENTS**

A practical guide instructing patients in layman's terms how to perform exercises according to the DNS concept. Self-treatment examples.

**1 year subscription**

Internet connection is required to access the videos. Videos cannot be downloaded, only online viewing is possible using a web browser. However, the **DNS App** allows both online and off line viewing.

Price: 20 €

After purchase, the subscriber will be emailed a username and password to log into the library. Electronic on-line version (e-pub) of exercise positions depicted on **DNS Self-treatment booklet, Pelvic floor exercise booklet and Exercise for individuals with breathing disorders booklet** available as a free bonus

Contains the following videos



Do you have back pain and don't know how to exercise?  
 Would you like to exercise to prevent musculoskeletal pain?  
 Find guidance in the DNS online video library for patients:  
<https://www.rehabps.com/video-on-line-patiens.html>

**DNS Videos**

1. **DNS for Patients**

2. **Exercise Set for Patients 1**

3. **Exercise Set for Patients 2**

4. **Exercise Set for Patients 3**

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