

Appendix

Stretching and strengthening exercises for A-group (supervised by physiotherapist)

All the given exercises were modified so that patient was able to perform them at home without help of physiotherapist. The home exercise program consisted normally minimum four stretching exercises (stretchings 1-4 below) and minimum three strengthening exercises (exercises 5-7 below). Verbal and written advice (Physiotoools Version 3.0, Physio Oy, 1998, Tampere, Finland) for exercises was given. If first exercise (A) was inappropriate, an alternative exercise was guided by physiotherapist. If first exercise considered insufficient to increase stretchability/strength, one or more supplemental exercises were guided by physiotherapist. Alternative/supplemental exercises are described in text and some (not all) in figures B-D.

Stretching exercises

The recommended frequency at home was once a day.

- 1) *Quadriceps femoris muscle* (Figure 1A): In standing position, the foot (stretching side) was placed backwards on the chair with the knee flexed. Then the flexed knee was laid on the floor, and increasing flexion of the knee and extension of the hip in stretching side increased stretching of the anterior thigh muscles. The alternative/supplemental stretching (Figure 1B): lay on the side (e.g. at the bed) with the knee flexed. Take a grip with the hand of the superior ankle, and pull the ankle against the gluteal region.
- 2) *Iliopsoas muscle* (Figure 2): The subject was asked to bend in the erect position and place the knee of the stretching side against floor (extremity backwards with hip extension); the other extremity forwards, hip and knee flexed and sole against floor, placing hands above the knee giving balance support, and then asked to tense abdominal muscles, rotate leg (calf) of the extended extremity laterally; tense gluteal muscles, and move the weight to the anterior lower extremity.
- 3) *Hamstring muscles* (Figure 3A): The subject was asked to sit on the edge of the table, and place the sole of opposite lower extremity against floor and stretching side extremity horizontally on the

table (hip flexion of stretching side being about 90 degrees). He/she then bent the trunk forward in the direction of the horizontal extremity. The alternative/supplemental stretching (Figure 3B): At supine position (bed or floor), the subject should hold the opposing lower extremity straight, and pull the knee of the stretched side with both hands against chest (with knee flexed, making less stretching for hamstrings, especially if patient had neural tension of n. ischiadicus).

4) *Low back muscles* (Figure 4): In the sitting position, the subject was asked to lower the trunk down to the space between the lower extremities with maximal lumbar flexion (kyphosis) and support with hands (from legs or floor), so as they experienced stretching in the lower back. Lateral bendings were also considered.

The strengthening exercises

The A-group was advised to perform given exercises at the beginning 2 times per week, and if suitable, then at 3-5 days per week. The number of repetitions in strengthening exercises was 60% of maximum repeats.

5) *Abdominal muscles* (Figure 5A): started in supine position, with knees 90 degrees and feet on the floor; the hands behind the neck. Tense abdomen, raise head and shoulders so that shoulder blades became detached from the floor.

The alternative/supplemental exercises for abdominal and hip flexor muscles: 5.1) additional weights 5.2) in the supine position the subject placed the hands behind neck, tensed the abdomen, placed the opposite elbow and knee together above the abdomen (oblique abdominal muscle exercises; Figure 5B) 5.3) in supine position with a pillow placed under the lumbar area, and the fingers crossed behind the neck. The subject was asked to raise the elbow and upper trunk upwards so that shoulder blades became detached from the floor. The subject was asked to tense the abdomen, pull the navel towards the spine (Figure 5C).

6) *Thigh- and gluteal muscles*: From the standing position, subject squatted to a sitting level, which was arranged so that the knees were at 90 degree flexion and thighs horizontally; the use of the

upper arms was not allowed. The alternative/supplemental exercises: 6.1) additional weights 6.2) the subject was asked to stand straight and take a step forward, and move his/her weight to the foremost extremity and to return to the starting position by using the foremost extremity. He/she had to keep the abdomen tense. 6.3) squatting movement to lower level so that knees were at >90 degrees.

7) *Back-, gluteal- and hamstring muscles* (Figure 7A): from supine position; knees approximately 90 degrees flexed and soles on the floor, lift pelvis maximally. The alternative/supplemental exercises (Figure 7B): 7.1) from supine position; knees approximately 90 degrees flexed and soles on the floor, lower extremities together: Tense and pull abdomen inward; tense gluteal muscles. Keep back straight, lift pelvis a bit from the floor. Move weight to another foot, and extend another knee. Do not let pelvis rotate or lean. Return slowly to starting position.

7.2) “All fours” –starting position. Tense abdomen and raise the lower extremities horizontally in turn (Figure 7C). 7.3) “All fours” – starting position. Raise opposite upper and lower extremity at the same time horizontally in turn. Keep abdomen tensed (Figure 7D).

APPENDIX 1

Figures of stretching and strengthening exercises.

Figure 1A. Stretching of quadriceps femoris muscle.



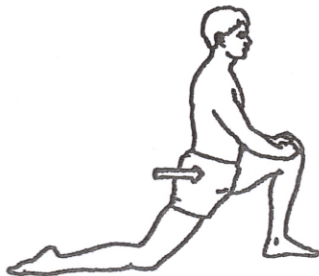
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Figure 1B. The alternative/supplemental stretchings of quadriceps femoris muscle.



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Figure 2. Stretching of iliopsoas muscle.



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Figure 3A. Stretching of hamstring muscles.



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Figure 3B. The alternative/supplemental stretching of hamstring muscles.



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Figure 4. Stretching of low back muscles.



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Figure 5A. Strengthening exercise of abdominal muscles.



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Figure 5B-C. The alternative/supplemental strengthening exercises of abdominal muscles.



5B



5C

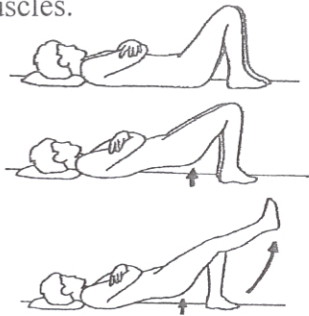
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Figure 7A. Strengthening exercises of back-, gluteal- and hamstring muscles.

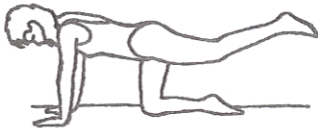


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Figure 7B-D. The alternative/supplemental strengthening exercises of back-, gluteal- and thigh muscles.



7B



7C



7D