A Patient Guide to Quadriceps Strengthening

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Anatomy of the Quadriceps

The Quadriceps Femoris is comprised of 4 muscles extending the knee; Rectus Femoris, Vastus Lateralis, Vastus Intermedius, Vastus Medialis – which can be seen in the picture below.

These knee extensors are crucial in the act of walking, jumping running and squatting with Vastus Medialis stabilizing the patella.

1. Rectus Femoris
2. Vastus Lateralis
3. Vastus Intermedius
4. Vastus Medialis
Common Reasons for Quad Weakness

**TRAUMA**
- Rupture of Rectus Femoris
- Quadriceps Tendonitis
- Meniscal Tear

**Patellofemoral Pain Syndrome**
- Improper Footwear
- Training Errors/Techniques
- Patellar Malalignment
- Stresses Upon Knee Structures

**Surgeries**
- Total Knee Arthroplasty (TKA)
- Total Hip Replacement
- Knee Reconstruction
- Knee Arthroscopies
- Cartilage Removals/Repairs
Physiotherapy and Prevention

It is important that the muscles in your thigh stay strong in order for them to -

- Prevent Injuries
- Allow good movement
- Carry out everyday tasks e.g. walking, stairs, running, jumping

Before strengthening, your leg must move freely in order to build up to full power. Simple stretching exercises can be found on page 6 of this handout, which are to be carried out when completing the strengthening exercises.

The strengthening exercises are then completed before moving on to some balance work all in the aim of restoring full power.

IF YOU DON’T USE IT
YOU LOSE IT
Initial Rehab (0 -48hrs)

If there has been a specific trauma to the quadriceps, the primary goal is to control pain and reduce inflammation.

PRICE should be carried out

**P**rotection: *Prevent further injury, cease activity/sport*

**R**est: *Key to preventing strain on injured area. Without rest the healing process can be harmed*

**I**ce: *Reduces inflammatory response + decreases pain. Apply for 20 minutes using a towel to prevent ice burn/irritation to skin*

**C**ompression: *Reduces swelling as a result of inflammatory process. Use an elastic bandage to allow expansion of muscles however must be a snug fit.*

**E**levation: *Decreases swelling by increasing venous return pf blood resulting in less oedema and pain.*
Quadriceps Strengthening Drill

1. **Straight Leg Raise**
   - **Phase 1:**
     - Long sitting
     - Lift affected leg straight off bed
     - Keep foot pointed towards ceiling
   - **Phase 2:**
     - Attach Theraband
     - Carry out exercise as above
   - **Phase 3:**
     - Light ankle weight (2kg)
     - Carry out Exercise as above
   
   *Do until leg is tired*
   
   **4 per day **  **5 per week**

2. **Straight Leg Raise (foot everted)**
   - **Phase 1:**
     - Long sitting
     - Lift affected leg straight off bed
     - Keep foot pointed outwards
   - **Phase 2:**
     - Attach Theraband
     - Carry out exercise as above
   - **Phase 3:**
     - Light ankle weight (2kg)
     - Carry out Exercise as above
   
   *Do until leg is tired*
   
   **4 per day **  **5 per week**
3. Inner Range Quads

THERABAND

Your physiotherapist will give you a piece of stretchy band known as a Theraband to place around your ankles in order to create some resistance whilst carrying out the exercises which make the muscles work a little harder. They come in a variety of strengths dependant on the colour starting with;

Yellow → Red → Green → Blue → Black

Phase 1:
- Long sitting
- Rolled up towel/foam roller under knee so leg is slightly flexed
- Lift affected leg straight off bed
- Keep foot pointed towards ceiling

Phase 2:
- Attach Theraband
- Carry out exercise as above

Phase 3:
- Light ankle weight (2kg)
- Carry out Exercise as above

Do until leg is tired

4 per day  5 per week
Basic Stretches

Stretches are essential after any form of exercise and should be carried out in order to prevent injury and tightness. Each stretch should be held for approx. 30 secs and completed before each round of strengthening.

1. **Quads Stretch**
   - Increase stretch by pulling knee further behind.

2. **Calf Stretch**
   - Increase stretch by leaning further forward.

3. **Soleus Stretch**
   - Increase stretch by bending back knee more.

4. **Hamstring Stretch**
   - Increase stretch by leaning further forward.
F.I.T.T principles were an essential factor to consider when putting the strengthening exercises together in order to create a routine-like aspect aimed to target the goals for the participants.

These include;

**Frequency** – How often the exercise is completed

**Intensity** – How hard the participant is working (gravity/theraband/weights)

**Time** – How long the session lasts and finally

**Type** – What exercise is being executed

(Waehner, 2014).

Having read the literature, resistance strength training has proved beneficial in adults if they are exercising 3-5 times per week (Murlasits, 2012). The study showed that 3 days per week sessions compared to that of the once weekly classes were superior and lead to physiological adaptions; however it must be noted that these were only in the short term. This highlighted that there can be a threshold of strengthening within the adult population.

3 studies; Bolton et al (2012), Basat et al (2013) and Stolzenberg et al (2013) showed that resistive training had significant increases in the results and average reps within each of the studies methods sections were around 12-15 for each exercise.
References


