

Madigan Army Medical Center

Musculoskeletal Treatment Guidelines

QUADRICEPS CONTUSIONS

Diagnosis/Definition

- A quadriceps contusion is a traumatic blow to the anterior (front), lateral (outside) or medial (inside) aspect of the thigh. They are characterized by pain along the injury site, pain during passive range of motion, swelling, discoloration, decreased range of motion, decreased strength and loss of overall function. The extent of a quadriceps contusion is based on a variety of factors, including the amount of force occurring during injury, the degree of muscular relaxation (which determines the depth of the injury) and any previous trauma to the injury site. As a result, patients with a quadriceps contusion will present with varying degrees of severity.
 - **Grade I (Mild)**
 - Consists of superficial intramuscular bruising that produces mild bleeding and swelling, little pain and mild point tenderness along the injury site. There is little or no loss of range of motion. The patient will have active knee range of motion $>90^{\circ}$.
 - **Grade II (Moderate)**
 - Consists of a deeper bruise consisting of moderate pain, swelling and discoloration along the injury site. Active knee range of motion is between 45° and 90° . The patient will demonstrate an obvious limping gait, possibly favoring the involved leg.
 - **Grade III (Severe)**
 - Consists of deep intramuscular mass, possibly causing it to bulge outward. Symptoms include severe pain, loss of function, and increased amount of edema and ecchymosis. Active knee range of motion is $<45^{\circ}$.

Initial Diagnosis and Management

- History and physical examination.
- Plain films if necessary
- Rest and elevation
- Ice and use compression
- Appropriate restrictions of activity.

Ongoing Management and Objectives

- Rest is individualized depending upon severity
- Immobilization is contraindicated in minor injuries however crutches should be used if ambulation is painful.

Madigan Army Medical Center

Musculoskeletal Treatment Guidelines

- **Phase I**

Initial treatment of a quadriceps contusion consists of limiting hemorrhage, mainly accomplished by **RICE**. When applying ice, instruct the patient to keep the knee flexed to facilitate the healing process. For Grades II and III, the patient should be given crutches with the leg wrapped in an ace bandage in a knee-flexed position.
- **Phase II**

After the acute phase, the patient can be discharged from the crutches when they demonstrate good quad control and a normalized gait. The patient can then progress to pain-free isometric quadriceps exercises and mild stretching to restore range of motion.
- **Phase III**

Return to pain-free functional rehabilitation, including strength, endurance and sport-specific drills.

Indication a profile is needed

- Any limitations that affect strength, range of movement, and efficiency of feet, legs, lower back and pelvic girdle.
- Slightly limited mobility of joints, muscular weakness, or other musculo-skeletal defects that may prevent moderate marching, climbing, timed walking, or prolonged effect.
- Defects or impairments that require significant restriction of use.

Specifications for the profile

- Weeks 1-6
 - Restrict jumping and running during Phase 1 and 2
 - No road marching
 - Walking to tolerance after Phase 1
 - Swimming recommended

Patient/Soldier Education or Self care Information

- See attached sheet
- Demonstrate deficits that exist
 - Describe/show soldier his/her limitations
- Explain injury and treatment methods
 - Use diagram attached to describe injury, location and treatment.
- Instruct and demonstrate rehab techniques
 - Demonstrate rehab exercises as shown in attached guide
 - Warm up before any sports activity
 - Participate in a conditioning program to build muscle strength

Madigan Army Medical Center

Musculoskeletal Treatment Guidelines

- Do stretching exercises daily
- Ask the patient to demonstrate newly learned techniques and repeat any other instructions.
- Fine tune patient technique
- Correct any incorrect ROM/stretching demonstrations or instructions by repeating and demonstrating information or exercise correctly.
- Encourage questions
 - Ask soldier if he or she has any questions
- Give supplements such as handouts
- Schedule follow up visit
 - If pain persists
 - The pain does not improve as expected
 - Patient is having difficulty after three days of injury
 - Increased pain or swelling after the first three days
 - Patient has any questions regarding care

Indications for referral to Specialty Care

- To Physical Therapy: Routine referral for rehabilitation.
- Orthopedic Surgery referral for all Grade III sprains and any grade if plain radiographs are suggestive of any pathology.

Referral criteria for Return to Primary Care

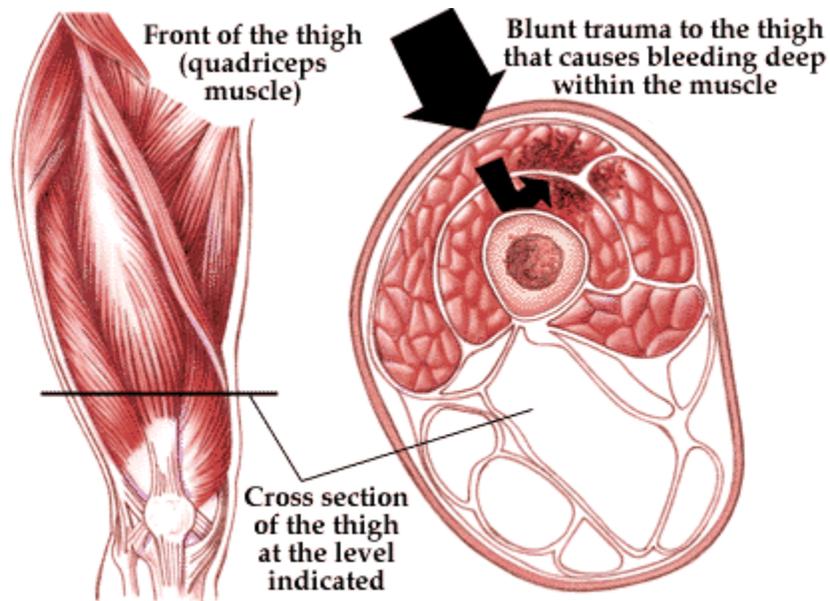
- Completed specialty care.

Madigan Army Medical Center Musculoskeletal Treatment Guidelines

Figures 1: Courtesy of Christopher M. Larson, MD



FIGURE 1. A plain radiograph of a 21-year-old woman who sustained a thigh injury during a soccer game reveals myositis ossificans (arrow) that resulted from a quadriceps contusion.



Madigan Army Medical Center

Musculoskeletal Treatment Guidelines

Leg Exercises

This exercise develops the *Quadriceps* muscle group, which is located on the front of your thigh. It should not be done with heavy weights and if you have any knee problems, should not be done at all.

How to do it:



- Sit in a Leg Extension machine with the pads over the top of your ankles and your back against the back pad.
 - Your upper calves should be about half an inch from the seat pad and your knees even with the pivoting cam of the machine.
 - Extend your legs up (straightening them), and squeeze at the top.
 - As you bring the weight back down, do not allow your knees to go past 90 degrees of bend. This will minimize knee stress.
 - This exercise should be done slowly and deliberately, allowing no momentum or explosive force to come into play. Using explosive force or momentum may lead to injury.
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Tricks:

- To work the outer quadriceps (*Vastus Lateralis* - runs along the outside surface of the thigh), lean back, turn your toes out slightly and point them.

Madigan Army Medical Center

Musculoskeletal Treatment Guidelines

- To work the teardrop or inner quadriceps (*Vastus Medialis* - is located a little above the knee on the inner thigh), lean over forward, curl your toes back and turn them slightly in.
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Common Errors:

- **Not squeezing at the top** - the best part of this exercise occurs at the contraction when your legs are straight. To get the most out of it, hold the contraction at the top for a few seconds then lower the weight.

Madigan Army Medical Center

Musculoskeletal Treatment Guidelines

PHYSICAL PROFILE																																
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DA FORM 3349, MAY 86

REPLACES DA FORM 5302-R (TEST) DATED FEB 84 AND DA FORM 3349 DATED 1 JUN 80, WHICH ARE OBSOLETE

USAPPC V100

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Musculoskeletal Treatment Guidelines

PATIENT INFORMATION

Quadriceps contusions, along with strains, are among the most common injuries in athletics. A quadriceps contusion is a traumatic blow to the anterior (front), lateral (outside) or medial (inside) aspect of the thigh. They occur primarily in contact and collision sports such as football, soccer, lacrosse and basketball. They are characterized by pain along the injury site, pain during passive range of motion, swelling, discoloration, decreased range of motion, decreased strength and loss of overall function. The extent of a quadriceps contusion is based on a variety of factors, including the amount of force occurring during injury, the degree of muscular relaxation (which determines the depth of the injury) and any previous trauma to the injury site. As a result, patients with a quadriceps contusion will present with varying degrees of severity.

Classifications

Grade I (Mild)

Consists of superficial intramuscular bruising that produces mild bleeding and swelling, little pain and mild point tenderness along the injury site. There is little or no loss of range of motion. The patient will have active knee range of motion $>90^{\circ}$.

Grade II (Moderate)

Consists of a deeper bruise consisting of moderate pain, swelling and discoloration along the injury site. Active knee range of motion is between 45° and 90° . The patient will demonstrate an obvious limping gait, possibly favoring the involved leg.

Grade III (Severe)

Consists of deep intramuscular mass, possibly causing it to bulge outward. Symptoms include severe pain, loss of function, and increased amount of edema and ecchymosis. Active knee range of motion is $<45^{\circ}$.

Management

Phase I

Initial treatment of a quadriceps contusion consists of limiting hemorrhage, mainly accomplished by **RICE**. When applying ice, instruct the patient to keep the knee flexed to facilitate the healing process. For Grades II and III, the patient should be given crutches with the leg wrapped in an ace bandage in a knee-flexed position.

Phase II

After the acute phase, the patient can be discharged from the crutches when they demonstrate good quad control and a normalized gait. The patient can then progress to pain-free isometric quadriceps exercises and mild stretching to restore range of motion.

Phase III

Madigan Army Medical Center

Musculoskeletal Treatment Guidelines

Return to pain-free functional rehabilitation, including strength, endurance and sport-specific drills.

Summary

Generally, quadriceps contusions should be managed conservatively. The decision to recommend return-to-sport should not come until the patient is free of pain. Additionally, care must be taken to avoid repeated trauma to the area, including providing proper protective equipment such as a thigh pad.

Madigan Army Medical Center

Musculoskeletal Treatment Guidelines

Input was provided by:

- Occupational Therapy Clinic
- Physical Therapy Clinic
- Orthopedic Clinic
- Family Practice Clinic
- Okubo Clinic
- 555 Engineers
- 1st Brigade
- 3rd Brigade
- 62nd Medical Brigade

POC:

- Outcome Management

References:

- Mellion, I., Morris B. (2002). Team Physician's Handbook, 3rd Edition. Hanley & Belfus, Inc: Philadelphia, PA.
- Lillegard, Rucker. (1999). The Handbook of Sports Medicine. A symptom-oriented approach, 2nd Edition. Butterworth-Heinemann Medical: Burlington, MA.
- Baechle, Thomas, Earle, Roger. (2000) Essentials of Strength Training and Conditioning, 2nd Edition. Human Kinetics Pub: Champaign, IL
- Schenck, Robert, Jr. et al. (1999). Athletic Training and Sports Medicine, 3rd Edition. American Academy of Orthopedics: Tucson, AZ.
- http://www.nismat.org/traincor/quad_contusion/
- http://www.physsportsmed.com/issues/2002/02_02/larson.htm