Quadriceps Contusions in Athletes

Background
1. Definition
   - Direct external blow to thigh resulting in pain, swelling, loss of knee ROM
     - Typically to a single quadricep muscle
2. General info
   - Increase swelling
   - Loss of knee flexion
   - Occurs morning after injury

Pathophysiology
1. Pathology of disease
   - Compressive force on muscle causes
     - Partial rupture of muscle
     - Capillary rupture
     - Infiltrative bleeding
   - Leads to hematoma, edema, and inflammation
2. Incidence, prevalence
   - Common in contact sports
     - Football
     - Rugby
     - Martial arts
     - Soccer
   - 90% of all sports-related injuries
     - Contusion and strain
   - Many unreported
3. Risk factors
   - Contact sports
   - Bleeding disorders predispose to severe injuries
4. Morbidity/mortality
   - Myositis ossificans
     - Calcium deposition into hematoma by osteoblasts
     - Calcification process stabilizes and shrinks 3-6 months after injury
     - Incidence 7-20%
     - Symptoms
       - Increase pain
       - Palpable mass
       - Initial improvement in ROM w/subsequent deterioration
     - Occurs frequent w/severe injury and recurrent injury
     - Treatment: conservative
       - Gentle active ROM
       - D/c heat, U/S
       - Surgery (rarely indicated)
   - Compartment syndrome
     - Increase swelling
     - Pain out of proportion to injury
     - Sensory changes
DVT, thrombophlebitis may occur after injury

Diagnostics

1. History
   o Direct blow to antr or lat thigh
     • Subsequent pain
     • Swelling
     • Limited knee ROM

2. Physical examination
   o Tense, swollen, tender thigh
   o +/- visible ecchymosis
   o Pain upon active straight leg raise
   o Passive knee flexion limited
   o +/- knee effusion
   o May ambulate w/ limp

3. Diagnostic testing
   o Not necessary for Dx
   o Lab evaluation
   o Diagnostic imaging
     • X-ray
       • R/o acute Fx
       • If suspect, evaluate for myositis ossificans
         o 1-2 mo after injury
         o 6 mo after injury
     o MRI
       • Useful
         • Localize and evaluate extent of injury
         • When definitive Hx is lacking
         • Allows sequential f/u if needed
         • Functional recovery occurs before MRI resolution
     o Ultrasound
       • Distinguishes
         • Diffuse swelling and edema vs localized, circumscribed hematoma
     o Other studies
       • Compartment syndrome
       • Compartment pressure testing

4. Diagnostic Criteria
   o Classification based upon ROM 12-24 hrs after injury
     • Mild (Grade 1)
       • Knee flexion > 90°
     • Moderate (Grade 2)
       • Knee flexion between 45°-90°
     • Severe (Grade 3)
       • Knee flexion < 45°

Differential Diagnosis

1. Key DDx
2. Extensive DDx
   - Neoplasm
   - Morel-Lavalle lesion
     - Shear injury - subQ tissue torn away from underlying fascia
     - Resultant cavity fills w/ large hematoma
     - Commonly in region of greater trochanter

Therapeutics
1. No evidence of a universally accepted Tx regimen
2. Acute Tx (first 24 hrs)
   - D/c activity
   - RICE (Rest, Ice, Compression, Elevation)
   - Immobilize and ice in pain-free flexion position
     - Results in:
       - Tamponade hemorrhage
       - Rapid ROM improvement vs immobilization in extension
       - Decrease risk of myositis ossificans
   - +/- crutches to assist w/ wt bearing
   - Avoid NSAIDs in first 24-48 hrs
   - Avoid heat and massage in acute phase
3. Further management (> 24 hrs)
   - Refer to physical therapy
   - Early mobilization important to restore function
     - Begin assisted ROM ASAP pain permitting
     - Do not force ROM
   - Caution: s/s of compartment syndrome
     - Surgical Tx
     - Not indicated per studies
     - Consider evacuation of hematoma or percutaneous drainage
       - No evidence to recommend Tx
     - Recommended Tx:
       - Monitor elevated compartment pressures
       - Nonoperative Tx for compartment pressures \( \leq 88 \text{ mmHg} \)
4. Long-term care
   - Cont phys therapy
     - ROM until pain-free
     - When ROM pain-free:
       - Advance strengthening and functional rehabilitation
     - Return to sports after
       - Full ROM restored
       - Quadriceps strength 90-95% of unaffected side
       - Sports activities performed w/o pain
   - Myositis ossificans
     - NSAID (indomethacin)
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- After 48-72 hrs
- No definitive evidence for prevention
- Use controversial
- Short-term benefit
  - Avoid corticosteroids- inhibit long-term healing
    - Repeat x-rays in 1-2 months and at 6 months to evaluate progress

Follow-Up
1. Return to office
   - If rehabilitation not progressing
   - 1 month - x-rays to evaluate myositis ossificans
2. Refer to specialist
   - Concerns about compartment syndrome
   - Athletes' recovery not progressing
   - Diagnostic uncertainty
3. Admit to hospital
   - For pain management (rarely)

Prognosis
1. Not well documented
2. Most recover fully w/o complications
3. Recovery time depends on injury severity and time to initial Tx

Prevention
1. 1° prevention
   - Thigh padding
2. To prevent exacerbation d/c play at time of injury
3. To decrease severity contract quadriceps muscle at time of injury

References

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