Exercise Induced Hematuria

Background
1. Definition
   - Benign, self-limiting hematuria occurring after strenuous exercise
   - Loss of intact RBC's into urine
   - > 2 RBCs per hpf
2. General info
   - May be gross or microscopic hematuria
   - Resolves after period of rest
     - Typically within 24-48 hrs
   - Influenced by exercise intensity and duration
   - Can originate in kidney, bladder, urethra, prostrate
   - Diagnosis of exclusion
     - Other more serious etiologies of hematuria must be ruled out

Pathophysiology
1. Pathology of disease
   - Traumatic
     - Renal or bladder injury secondary to repeated impact of bladder wall against bladder base
     - Causes vascular lesions and hematuria
   - Non-traumatic:
     - Vasoconstriction of splanchnic, and renal vessels occurs to shunt blood toward working skeletal muscle during exercise
       - Causes hypoxic damage and lactic acidosis
       - Causes glomerular permeability
         - Passage of RBCs into urine
     - Efferent arteriole increases filtration pressure
       - More RBCs excreted into urine
   - Resolves within 24-72 hours post exercise
     - If not resolved within 7 days
       - Consider further microscopic hematuria workup
2. Incidence, prevalence
   - Higher prevalence in athletes vs general population
   - More common in high-intensity / long-duration workouts
3. Risk factors
   - Non-contact sports
     - Rowing, running, swimming, lacrosse, bicycling, snowmobiling
   - Contact sports
     - Boxing, football
   - Near-empty bladder
     - May increase bladder wall impact against bladder base "bladder slap"
   - Sickle cell trait
4. Morbidity/mortality
   - Benign
   - No long term morbidity

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May lead to anemia in competitive athletes with repeated hematuria\(^4\)

- If not resolved by 72 hours post exercise, further investigate for other hematuria causes

**Diagnoses**

1. **Diagnosis**
   - Urine dipstick: able to detect 1-2 RBCs per hpf
     - UA microscopy: > 2 RBCs per hpf is considered hematuria\(^1\)

2. **History\(^11\)**
   - Recent rigorous exercise
   - No flank or pelvic pain
   - No dysuria
   - No penile/vaginal discharge
   - No hesitancy, nocturia, urgency, or frequency of urination
   - No history of trauma
   - No history of kidney/bladder/urethral injuries
   - No family history of kidney disease
   - No symptoms of prostate disease
   - Obtain menstrual history

3. **Physical examination\(^11\)**
   - Genitourinary exam is often normal
   - Consider pelvic exam in females to rule out for vaginal sources of bleeding
   - Look for signs of trauma
     - Ecchymosis over flank suggest renal trauma
     - Ecchymosis over bladder or genital suggests bladder/urethral trauma

4. **Diagnostic testing\(^11\)**
   - Consider CBC for evaluation of anemia if:
     - Gross hematuria
     - Microscopic hematuria does not resolve
     - Hematuria is frequent
     - Consider imaging if hematuria fails to resolve within 7 days
     - Urine culture if suspect UTI
     - CBC, BUN/creatinine, sickle cell prep
     - Renal ultrasound or CT if suspect trauma or renal disease
     - IVP: low-cost, yet limited sensitivity for detecting small renal masses
       - Also, requires exposure to contrast which is potentially nephrotoxic\(^12\)
     - Cystoscopy: consider if those age 40 or more, those with risk factors for bladder cancer, or with abnormal urine cytology\(^13\)
     - If > age 40, consider urology referral for further testing
       - Excretory urogram and cystograph
   - Urine dipstick
     - Detects 1-2 RBCs/hpf
     - False positives
       - Myoglobinuria
       - Semen
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UA
- Repeat in 24-72 hours w/o exercise
- >2 RBCs/HPF = hematuria

Differential Diagnosis
1. Key DDx
   - Myoglobinuria caused by rhabdomyolysis
   - March hemoglobinuria
   - UTI
2. Extensive DDx
   - Bladder/kidney/prostate cancer
   - BPH
   - Nephrolithiasis
   - Endometriosis
   - Intrinsic glomerular disease
   - Polycystic Kidney Disease
   - Vaginal bleeding
3. Other causes of red urine
   - Analgesics, extended-spectrum penicillins, aspirin, aminoglycosides
   - Vegetable dyes
   - Beets/berries
   - Factitious

Therapeutics
1. No Tx if resolves in 72 hours
2. Self-limiting

Follow-Up
1. Return to office
   - In 72 hours to repeat UA, r/o other hematuria causes
2. If no resolution in 7 days
   - Refer to specialist
3. Admit to hospital
   - If signs of trauma
   - Significant anemia

Prognosis
1. Excellent

Prevention
1. Bladder
   - Hydration during exercise to partially fill bladder, prevent bladder wall impact against its base
2. Prostate/urethra
   - Adjust seat height/pitch in bicyclists
3. Avoid strenuous exercise
References


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