

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 ¹
2. General info
 - May be gross or microscopic hematuria
 - Resolves after period of rest
 - Typically within 24-48 hrs²
 - Influenced by exercise intensity and duration³
 - 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 ²
 - 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 population⁵
 - More common in high-intensity / long-duration workouts ³
3. Risk factors
 - Non-contact sports
 - Rowing, running, swimming, lacrosse, bicycling, snowmobiling^{4,6,7,8}
 - Contact sports
 - Boxing, football,
 - Near-empty bladder ⁷
 - May increase bladder wall impact against bladder base "bladder slap"
 - Sickle cell trait
4. Morbidity/mortality
 - Benign^{9,10}
 - No long term morbidity ^{9,10}

- May lead to anemia in competitive athletes with repeated hematuria¹⁴
 - If not resolved by 72 hours post exercise, further investigate for other hematuria causes

Diagnostics

1. Diagnosis
 - Urine dipstick: able to detect 1-2 RBCs per hpf
 - UA microscopy: > 2 RBCs per hpf is considered hematuria¹
2. History¹¹
 - 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 examination¹¹
 - 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 nephrotoxic¹²
 - Cystoscopy: consider if those age 40 or more, those with risk factors for bladder cancer, or with abnormal urine cytology¹³
 - If > age 40, consider urology referral for further testing
 - Excretory urogram and cystograph
 - Urine dipstick
 - Detects 1-2 RBCs/hpf
 - False positives
 - Myoglobinuria
 - Semen

- UA
 - Repeat in 24-72 hours w/o exercise
 - >2 RBCs/HPF = hematuria ¹

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
 - Meds
 - Analgesics, extended-spectrum penicillins, aspirin, aminoglycosides¹¹
 - 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 ⁷
2. Prostate/urethra
 - Adjust seat height/pitch in bicyclists
3. Avoid strenuous exercise

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