Rhabdomyolysis after spin class?

Two case reports involving the increasingly popular activity of “spinning” underscore the need for proper conditioning and adequate hydration before exercising strenuously.

Primary care physicians frequently encourage patients to lead a more active, healthy lifestyle. The rise in popularity of endurance events, yoga, and organized gym-based fitness classes has, no doubt, improved the health of those who participate. But what happens when an individual moves too quickly from a sedentary existence to a more physically active one?

In this article we describe 2 clinical cases of rhabdomyolysis that occurred after healthy individuals participated for the first time in a class involving high-intensity stationary cycling, known as “spinning.” This exercise activity originated in California around 1989 when a competitive cyclist introduced variable resistance and speed training to stationary cycle workouts.1 Over the last 10 years, spinning has gained a worldwide following as a means of building cardiovascular endurance while achieving a significant calorie burn.

CASE 1

Lack of conditioning, improper hydration spell trouble

A previously healthy 38-year-old white man presented with left lower extremity pain and dark urine. Three days earlier, he had participated in a spin class for the first time. Despite a sedentary lifestyle, he had no difficulty completing the session and felt fine during the class. He did feel mildly fatigued afterward. The next day, he began noticing discomfort and swelling in his left knee, which progressed to his anterior thigh. That evening, he became concerned because of a dark red tint to his urine. He was not taking any medications.

The physical exam was unremarkable except for a moderately swollen, tender knee with reduced range of motion. An x-ray of the knee showed a moderate suprapatellar effusion, but no fracture or dislocation. Urinalysis was remarkable for blood and myoglobin. The CPK value was 149,985 U/L (normal, 24-170 U/L), AST was 2234 U/L (normal, 9-25 U/L), ALT was 570 U/L (normal, 7-30 U/L), and BMI was 26.6 kg/m². Renal function was normal, as evidenced by a BUN of 17 mg/dl and a creatinine level of 1.0 mg/dl. He was afebrile and his WBC count was 9.6 x 10³/mm³.

We hospitalized the patient with a diagnosis of rhabdomyolysis and started him on aggressive intravenous (IV) hydration. The patient’s CPK and transaminase levels started trending down the next day, urine output (UOP) remained at goal, and renal function remained stable. Pain and swelling diminished over the next 3 days. He was discharged home on Day 4. At discharge, his CPK level was 26,180 U/L, BUN 10 mg/dl, and creatinine 0.8 mg/dl. At 1 month follow-up, his CPK was within normal limits.

CASE 2

Even those who exercise regularly can overdo it

A previously healthy 26-year-old white wom-
A sudden increase in exercise intensity and duration, without proper training, can increase the likelihood of rhabdomyolysis. People who exercise regularly are less likely to develop the condition than their more sedentary counterparts. As with our cases, a sudden increase in the intensity and duration of vigorous exercise, without proper training, may increase the likelihood of rhabdomyolysis.

### Other potential underlying causes

In addition to exercise and dehydration as depicted in our cases, rhabdomyolysis can result from burns, shock, acidosis, infections, crush trauma, immobility, malignancy, medications, toxins, abuse of drugs, or pre-existing illness such as sickle cell trait or other metabolic conditions.

### Clinical presentation varies

Regardless of the cause, patients typically present with muscle pain, weakness and cramping, and discolored urine. However, many patients will have dark urine associated with other symptoms, such as general malaise, visceral pain, swelling, muscle stiffness and tightness, fever, tachycardia, nausea, and vomiting. A careful history may help elucidate the cause.

### Laboratory clues

Diagnostic guidelines commonly specify a serum CPK level 5 times the upper limit of normal as an indication of rhabdomyolysis, specifically in the exertional variety. Typically the level of this is around 1000 U/L. However, there is no agreement on what CPK level is diagnostic of rhabdomyolysis. Suggestions range from 1000 to 20,000 U/L. A CPK level in excess of 5000 U/L increases the risk for acute renal failure and renal cell death. In athletes, an elevated CPK after working out is not uncommon and may be much higher than in other individuals. Endurance exercises such as marathon running or cycling have been noted to elevate CPK for up to 2 hours postexercise.

Myoglobin becomes detectable in urine
when it exceeds 1.5 mg/dL. Urine becomes tea-colored or reddish-brown when myoglobin is >100 mg/dL. Complications from rhabdomyolysis include compartment syndrome, hyperkalemia, disseminated intravascular coagulation, coagulopathies, and acute renal failure.

Treatment for rhabdomyolysis consists of aggressive IV hydration with normal saline (with variable rate) or crystalloids to maintain a UOP of 200 to 300 mL/h. Avoid fluid overload in the elderly and those with renal or cardiac disease. As CPK and myoglobin continue to trend down, it’s important to adjust IV fluids and electrolyte replacement. Using bicarbonate to alkalize the urine is controversial, with no studies showing any benefit. In severe situations, consider a nephrology consult for hemodialysis to bring down CPK, which may be secondary to renal failure and hyperkalemia. However, renal failure is less likely to occur in physically active, healthy athletes.

Advice after recovery. After an episode of acute rhabdomyolysis, conditioned athletes can return to physical training with resolution of their symptoms or a CPK level from 1000 to 5000 U/L, usually within a week. A more judicious approach may be needed for less fit individuals. Regardless of their fitness level, advise patients to avoid diuretics and alcohol before exercise, remain hydrated during and after exercise, and avoid overheating to decrease the likelihood of developing rhabdomyolysis. However, in patients with sickle cell trait, exertional sickling can occur with intensity of exercise without overheating.

In the case of our male patient, poor physical conditioning and intensive, prolonged exercise followed by poor hydration and the diuretic effect of alcohol created the perfect storm for the development of rhabdomyolysis. On the other hand, our female patient routinely exercised, but still pushed herself beyond her limit and went too far too fast. Although BMI may play a role in the development of rhabdomyolysis, it does not appear to be as significant a factor as hydration status and overall physical conditioning.

Our patients’ prompt attention to the need for medical help and the recognition of the problem by their clinicians contributed to good outcomes in both cases.

References