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PHOTO FOR ILLUSTRATION ONLY.

Pumped up

Watching for signs of steroid use

It's a quiet Saturday morning as your crew considers the possibility of catching some of the upcoming baseball games when your dispatcher drops your alert tones.

"Medic 111, Engine 111...respond to 123 Main Street for an unconscious male. Time out 1108."

As you arrive at the scene, you do a quick scene survey and find no obvious scene safety issues. The dispatched address is a typical single family house sitting across the street from a recreation park where children are playing. As you walk to the door, a male in shorts and a gym shirt meets you at the door. He leads you to the kitchen where his friend is on the floor, drooling from the left side of his mouth. His eyes are open but he is not verbally responsive.

While your partners begin care by starting oxygen therapy, getting a set of vitals and attaching electrodes from the cardiac monitor, you talk to the man who met you at the door. He says his friend is 29 and has been in perfect health until this morning, when he woke up with a severe headache. He also says that his friend, who appears muscular and healthy, has been training for a weightlifting competition, but about fifteen minutes ago the patient started slurring his words and then slumped to the floor. This friend says he doesn't know of any medical problems the man on the floor might have and he knows that he doesn't take any medications and denies knowledge of allergies of any kind. However, several opened syringes and a few brown bottles



that appear to be prescription bottles are noted on the kitchen counter. One has "Clomid" written on it in black magic marker, but the friend does not know to whom it belongs.

Your partners come back with their assessment that no trauma is obvious, and that the patient is breathing 24 times per minute with clear lung sounds, a heart rate of 110 and blood pressure of 170/116. The patient is in a sinus tachycardia and his blood sugar reading is 98 by glucometer.

As your team prepares to transport the patient, two intravenous lines are established since he has an altered level of consciousness. Fifty percent dextrose is not considered because the

patient has a normal blood sugar. A brief trial of Narcan is administered following your Altered Level of Consciousness protocol, but you are not sure your patient needs this either. Two mg of IV Narcan does nothing for the patient's ability to speak and his repeat vitals are relatively the same.

Outside the window the real cause of your patient's problem can be found. On one side of a baseball diamond chain link fence children are throwing baseballs, oiling the leather of their gloves, and laughing as they play. In the distance, the crack of the bat signals spring has arrived and the fresh blades of grass serve as confirmation of this. Beyond this pristine view of blue skies and green grass is

something more sinister...something hard to detect and something that brings a black cloud to this child's game...an illegal drug. Not the ones that bring to mind thoughts of gang warfare and street crime. Something much more subtle has pervaded our playgrounds and gyms—steroids.

Steroids have found their way into our public consciousness again recently after the *San Francisco Chronicle* published leaked federal grand jury testimony that some of baseball's biggest stars had knowingly, or unknowingly, used steroids during their careers. Allegations have been made that as many as 40-50 percent of professional baseball players use steroids¹. What is the implication to local emergency medical response?

One problem is that most statistics come from case studies rather than epidemiologic studies² and there exists a significant possibility that serious adverse side effects are under-recognized and under-reported.³ In fact, the side effects of anabolic steroids can be significant and emergency medical personnel should prepare themselves for the possible consequences of anabolic steroid use in their community. Abuse of anabolic steroids has increased approximately 50 percent among eighth and tenth grade students according to the Monitoring the Future Study,⁴ with the most notable rise among female users.

Steroids are illegal without a prescription and are Schedule II drugs under the Controlled Substances Act. Simple possession of illicitly obtained anabolic steroids carries a one-year prison term and \$1,000 fine for first offenses in the federal system. Additional convictions can double the penalty. Many states also have penal-

Objectives:

1. The student shall understand the prevalence of anabolic steroid use in the community.
2. The student shall understand the significance of anabolic steroids to normal cardiovascular function.
3. The student shall be able to recognize the disease processes that may be linked to anabolic steroid use.



ties in addition to the federal standards.⁵

Many websites exist that talk about relatively minor side effects including acne, baldness and sexual dysfunction^{6,7}. While these symptoms may seem minor at first, anabolic steroids can have much more significant side effects, such as stunted growth for adolescent steroid users, behavioral changes and significant cardiovascular and hepatic illness^{8,9} which are not only serious, but can be deadly.

Cardiovascular Disease

With steroid use, the heart is often the first organ that is mentioned because steroids may cause increases in bad cholesterol levels^{10,11,12}. High levels of cholesterol can cause the thickening of arterial walls that makes them atherosclerotic, or inelastic. However, some researchers contend that cholesterol changes may be determined by the type of activity the athlete is involved in, noting that some competitors involved with primarily aerobic sports do not have the same increases in cholesterol as those involved with less aerobic workouts.¹³

While the lack of long-term studies has made it difficult to fully determine whether or not the use of steroids has a negative effect on the heart, some data exists to suggest that anabolic steroid use in higher doses can cause hypertrophy of the left ventricle, which results in a decreased diastolic filling.¹⁴ With less fill, there is less flow and subsequently lower cardiac output. This lower cardiac output secondary to steroid use may be responsible for heart attacks and strokes in athletes less than 30 years old¹⁵.

While most EMS providers feel

comfortable treating chest pain or stroke, most EMS responders are not going to associate a patient with an altered level of consciousness and under age 30 as possibly having a cerebrovascular attack (CVA) or transient ischemic attack (TIA). A 30-year-old athlete who is otherwise healthy and without medical history probably would not be expected to have CVA or TIA. EMS providers should keep anabolic steroids in the back of their minds as a possibility.

Liver Disease

Another area of concern is proper liver function. Whereas cardiac complications are less studied, there is a greater knowledge base on liver function because of drug studies that occurred with patients who were hospitalized with other conditions such as anemia, kidney failure and pituitary gland dysfunction.

One report showed that patients treated with anabolic steroids had decreased hepatic function and increased risk for liver cancer and portal hypertension. Additionally, a condition called hepatic peliosis can occur. Hepatic peliosis is a deterioration of the liver marked by the development of hemorrhagic cysts. Hepatic peliosis often involves multiple blood-filled spaces, or cysts, on the liver, which may vary in size from millimeters to centimeters in diameter. There are two types of cysts that develop and either can rupture, leading to severe intra-abdominal bleeds or the release of a thrombus.¹ Rupture of these cysts can be fatal². Often this condition is not diagnosed until the liver is in failure status, or a severe abdominal hemorrhage has occurred.³ Hepatic peliosis can occur

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secondary to tuberculosis, but the medical community now believes that it is currently best associated with anabolic steroid use^{4 5}.

Hormone Issues

Hormone issues should not be a surprise to medical providers as anabolic steroids are derivatives of testosterone and affect the reproductive system.

Steroids first lower the overall production and release of luteinizing hormone (LH) and follicle stimulation hormone (FSH). This decrease in hormone level and the duration, dosage and structure of the steroids are important to normal levels of gonadotropins. When these levels fall off in male athletes, testicular atrophy occurs.²¹

The addition of anabolic steroids to the body can also result in increased estrogen levels causing gynecomastia. This well-known steroid side effect is the development of breasts on male athletes using steroids. Further, gynecomastia is generally irreversible.

In males, sexual appetite is increased, as sexual desire is androgen dependent, but erectile dysfunction (ED) is also increased. As will be discussed in more detail later, steroids can cause various psychological aggression issues, but the combination of an increased sexual appetite and aggressiveness, combined with sexual performance issues, can also increase the possible occurrence of sexual assaults²². The actual steroid use may in fact be related to previous sexual abuse. In one set of interviews, 25 percent of male athletes who abused steroids reported memory of physical or sexual abuse²³.

In female athletes, the relatively small amount of testosterone the body produces is vastly increased by the use of steroids. Again, this is dependent to some degree on the dosage and duration of drug use, but will impact follicle formation, ovulation and menstrual irregularities.²⁴

Psychological Issues

Competitors who use anabolic steroids may suffer several different behavioral issues known as "roid rage." The increases in circulating testosterone that steroids cause can cause aggressiveness, the previously noted sexual appetite and assertiveness. Some athletes consider this a positive side effect as it makes them better able to be competitive during their sporting events. Since many athletes also use steroids as part of a training regimen for a specific competition, they take the drug in any number of dosing intervals.

Some intervals combine different steroids and anti-side effect drugs called "stacking." This method is designed to produce a synergistic effect from the drugs, purportedly increasing muscle size above and beyond what the individual drugs produce. Another method is "pyramiding" where athletes will start with low dose steroids and steadily increase the dosing during training. On the second half of the cycle, the drugs are decreased. This method is used to allow the body time to recover from the hormonal imbalances caused by the steroid use.

In either case, withdrawal symptoms can occur in users of these drugs. Mood changes, depression, violent behaviors and acute psychosis can all occur. In these situations,



EMS responders must follow departmental rules and common sense, and remember scene safety at all times.

Other Issues

Other issues related to steroid use can include the closure of epiphyseal plates, stopping growth, due to testosterone levels reaching certain levels^{25, 26}. This can cause some adolescents to have stunted growth instead of reaching their full height.

Renal problems may occur too as the renal system is one of the body's two main buffer/filter systems. Electrolyte imbalances and kidney problems may be seen in peripheral edema, lower back pain and swelling in the lower back.

Summary

Now, return to your Saturday morning call. As you transport your patient to the hospital, you perform a detailed survey to try to locate any possible injury. Assessing the patient further, you notice his left hand grip strength is weaker and the drooling from his mouth is caused by facial droop. Suspecting a possible stroke in your patient, you complete a thrombolytic eligibility checklist and pre-alert your medical direction team and receiving hospital of your latest findings.

You are able to transfer care successfully and the hospital neurologist is able to assist the emergency department team in treating this patient, who later admits to anabolic steroid use.

In treating patients, it is important to remember that calls are not always what we expect. We may all get "pumped up" about making another call, but let's not forget that some of

our patients are getting "pumped up" with the wrong fuel. Whether it is the kid next door or the high-profile superstar athlete, both are at risk for seriously "pumping up" the wrong side effects.

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CE questions—Medical

Steroid Use

1. Few studies exist that look at anabolic steroids from a medical perspective and their medical benefits and negative side effects.
A. True
B. False
2. Anabolic steroid side effects can cause:
A. Hypertension.
B. Liver disease.
C. Loss of growth plates.
D. All of the above
3. It appears that athletes involved with aerobic competition and training may not have the same increases in cholesterol levels as other, less aerobic trained athletes.
A. True
B. False
4. What percentage of male athletes who admit to using steroids indicated a past history of physical or sexual abuse?
A. Five percent
B. Ten percent
C. 25 percent
D. 40 percent
5. Cardiac hypertrophy occurs from steroid use and affects cardiac output because of:
A. Decreased systolic filling.
B. Increased systolic filling.
C. Decreased diastolic filling.
D. Increased diastolic filling.
6. Heart attacks and strokes have occurred in athletes using steroids. This usually affects patients under:
A. 25 years old.
B. 30 years old.
C. 40 years old.
D. 50 years old.
7. Liver diseases and problems from anabolic steroid use can include all of the following except:
A. Cancer.
B. Grave's disease.
C. Hepatitis peliosis.
D. Portal hypertension.
8. Some steroid users will take steroids in cycles called "stacking" or "pyramiding" to develop their musculature more effectively. The benefit of steroid use in this manner is that there is no withdrawal like with other drugs.
A. True
B. False
9. Most of the public outcry about steroids are that they change the competition but anabolic steroids are legal and have few side effects.
A. True
B. False
10. "Roid rage" is a term that relates to:
A. A type of steroid.
B. The popularity of steroids among teenage youth.
C. Aggressive tendencies, secondary to steroid use.
D. A strong, conditioning work out after an athlete stops using steroids.

This answer sheet must be postmarked by April 20, 2005.

CE Answer Sheet *Texas EMS Magazine*

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Note: Due to the cost of processing CE, each answer sheet must be accompanied by a check or money order for \$5, made out to UT Southwestern.

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Answer Form

Check the appropriate box for each question. All questions must be answered.

- | | | | | | | | |
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| 1. A. <input type="checkbox"/> | B. <input type="checkbox"/> | 6. A. <input type="checkbox"/> | B. <input type="checkbox"/> | C. <input type="checkbox"/> | D. <input type="checkbox"/> | | |
| 2. A. <input type="checkbox"/> | B. <input type="checkbox"/> | C. <input type="checkbox"/> | D. <input type="checkbox"/> | 7. A. <input type="checkbox"/> | B. <input type="checkbox"/> | C. <input type="checkbox"/> | D. <input type="checkbox"/> |
| 3. A. <input type="checkbox"/> | B. <input type="checkbox"/> | 8. A. <input type="checkbox"/> | B. <input type="checkbox"/> | 9. A. <input type="checkbox"/> | B. <input type="checkbox"/> | | |
| 4. A. <input type="checkbox"/> | B. <input type="checkbox"/> | C. <input type="checkbox"/> | D. <input type="checkbox"/> | 10. A. <input type="checkbox"/> | B. <input type="checkbox"/> | C. <input type="checkbox"/> | D. <input type="checkbox"/> |
| 5. A. <input type="checkbox"/> | B. <input type="checkbox"/> | C. <input type="checkbox"/> | D. <input type="checkbox"/> | | | | |

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