

Her love of tennis had become an abiding passion. But could it be the cause of the tremendous swelling of her right arm?

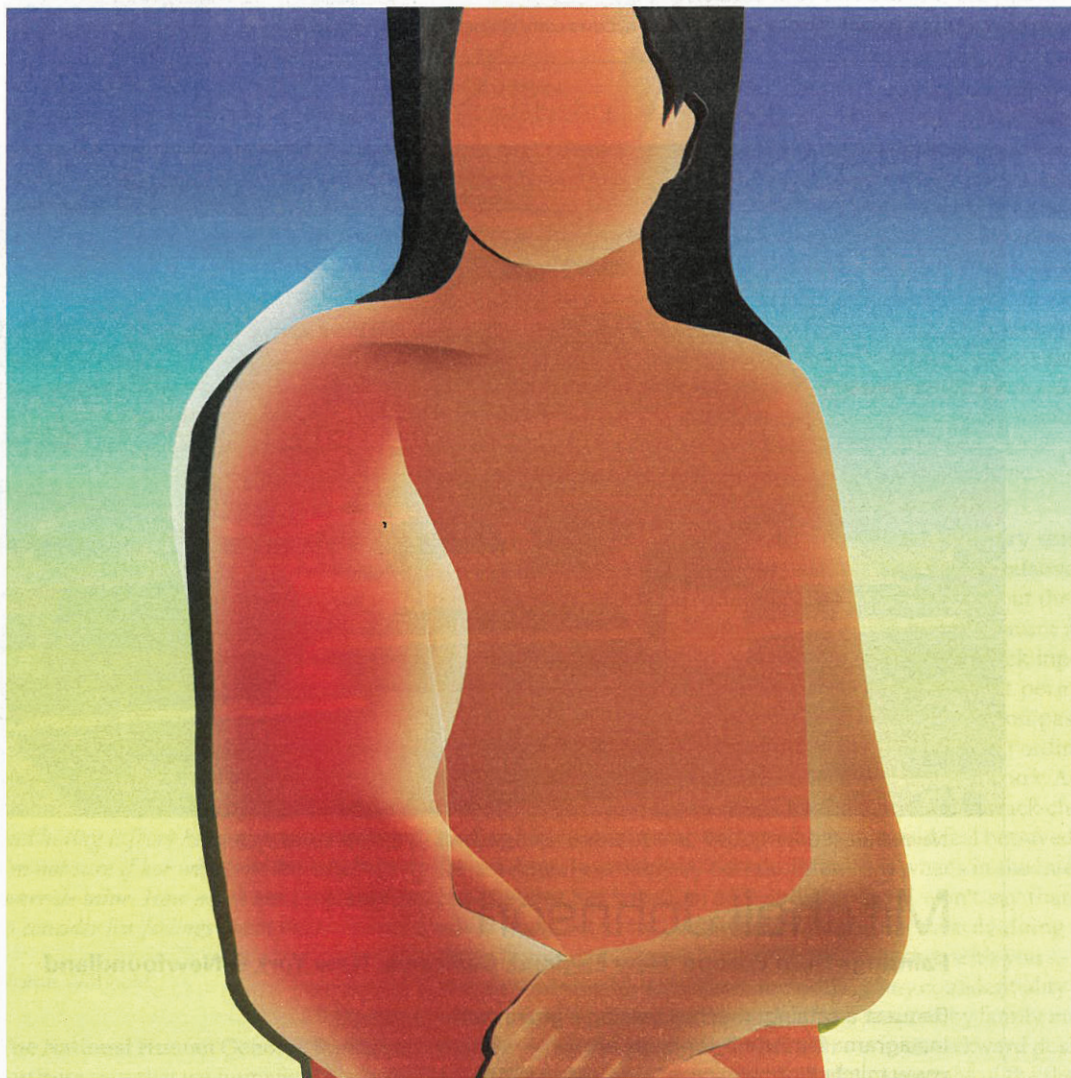
“Hell, no!” the man exclaimed as he saw his 49-year-old wife enter the kitchen. Her right arm was huge, swollen. “You have to go to the E.R.,” he said. She was wearing a strapless summer dress, and her bare tanned shoulders made it easy to see that her entire arm, from wrist to clavicle, was much larger than her left, as if somehow it had been pumped full of air.

That arm had been giving her trouble off and on for the past year, but it had never been swollen. The aches and pains she had up to now she attributed to her passion for tennis. She started playing after she and her husband moved from London to the suburban town of Larchmont, N.Y. She saw that many of the women there played, so she took up the game as a way to meet people and make friends. It was a good strategy. Many of her closest friends were among those she met at the court. And while it started as a social strategy, it quickly became an obsession. She played virtually every day, year-round. And in the summer, she could play all day every day and really work on her game.

Everything changed after she took a class to improve her serve. In 30 minutes she must have hit 100 serves, and that familiar pain returned. This time it stayed. She decided to take a break to give her arm a chance to heal, but it was still sore when they traveled to their beach rental in Montauk a week later. By then, the pain seemed different. It was no longer the sore-muscle-and-tendon discomfort she had become used to. This felt deeper: an ache that spread throughout her shoulder, down to her elbow. Even before they went to Montauk, the woman noticed that her shoulder looked a little swollen. The day her husband sent her to the E.R., the swelling had spread down the arm to the wrist.

As she examined her enlarged limb, she took note of a sore she had seen earlier near the crease of her elbow. It had been there a few days. Had she been bitten or stung? She hadn’t felt anything. But beneath her dark tan she could see some red. Was this the hallmark rash of Lyme disease?

That afternoon she went to a local urgent-care center. After hearing her story, the doctor started her on Doxycycline, an antibiotic used to treat tick-borne diseases. She had taken the first dose just a few hours earlier, but her husband was right — her arm was clearly getting worse. So when he suggested that she go to the emergency



room, she got in the car and drove herself to Stony Brook Southampton Hospital.



A Mosquito Bite?

In the E.R., Elizabeth Keane was the physician assistant assigned to see the woman. She quickly scanned the patient's electronic medical record: Swollen painful arm. Insect bite. Normal vital signs. No fever. Keane could see the woman on a stretcher in the E.R. hallway. The patient was slender and tanned. She didn't look sick but was clearly uncomfortable. Even at a distance it was easy to see why.

Keane walked over and introduced herself. She listened to the patient's story and then examined the arm. There was a small, healing bite on the inside of the elbow. It looked like a mosquito bite — not a spider or tick bite. The skin wasn't warm or particularly red, but the arm was tender. She couldn't feel any enlarged lymph nodes. It didn't look like an infection. Had there been an injury to the area? There was no bruising visible. Could she move the arm? The woman demonstrated that she could. Finally, Keane asked the patient if she lifted weights. No, she replied; she was a tennis player.

"I think I know what this is," Keane said. She found a computer and ordered some studies to test her hypothesis and to rule out other possibilities. She thought Lyme disease or another tick-borne illness rather unlikely. The patient could have a ruptured tendon or muscle, but that kind of injury would make movement difficult, and the patient had moved her arm easily. Cellulitis — an infection in the skin — was possible. But those kinds of infections usually make the skin hot and red. After putting in orders for the tests, she hurried on to see the next patient.

Between patients, Keane checked the woman's results. Her white-blood-cell count was normal. So were the markers of inflammation that usually accompany an infection. The rest of the lab results were equally unremarkable. Same with the chest X-ray. But the most important test, the test that Keane suspected would provide an answer, still hadn't been done, so she plunged back into the activity of the E.R.

The patient waited restlessly on the stretcher. It was hard to get comfortable. Finally she was taken to a small, recessed area. A technician squirted some cool goo onto the patient's neck and shoulder, then

took a hand-held ultrasound wand and held it to her neck. Grainy images with streaks of blue and red appeared on a screen. The woman moved the device down the patient's neck to her shoulder and arm, before holstering the device into the machine. "I'll be right back," she said. She picked up the phone to let Keane know what she had seen.



A Dark and Murky Line

The thick, dark lines that the technician saw were the veins that carried the patient's blood from her arm back to her heart. Streaks of blue and red showed the blood moving through the vessels. It was the section of the line where there was no color that caught the technician's attention. This part of the thick line was dark and murky. The murky line started at the base of the woman's neck and extended over her shoulder and down her arm halfway to the elbow. There was no blood flow there, and that indicated a clot.

This kind of clot is usually caused by a change in the local anatomy. It's a condition called thoracic-outlet syndrome. As the vein travels up the arm carrying deoxygenated blood back to the heart and lungs, it must pass between the top-most rib and the clavicle. It's a tight spot, but the two bones are usually far enough apart so that blood flows easily. The vein is boxed into the space by two muscles: the anterior scalene, a neck muscle that

runs from three upper vertebrae to the first rib, and the subclavius muscle that connects that first rib to the clavicle. In those who use their shoulder and arm to work or play, the scalene can get larger, making a tight spot even tighter. Sometimes, the area gets so tight that blood flow is slowed and a clot forms. And this was what happened to the patient.

The tennis player's ambitious work on her serve may have injured the muscles of her arm and neck, and the resulting inflammation and swelling were sufficient to slow or even stop the flow of blood on its way back to the heart and lungs from the arm. This condition is more likely to occur in serious athletes who stress their arms, like tennis players or baseball pitchers. It can also happen to workers who use their arms over their heads, like painters or teachers who write on blackboards. It's not just painful; it's dangerous. If the clot breaks off, it can be carried into the lungs, blocking blood flow there in what's known as a pulmonary embolism, causing serious injury to the lung and sometimes death.

The patient was started immediately on blood thinners. These medicines stabilize the existing clot and prevent new clots from forming. The following week the patient had surgery to remove the clot. Almost instantly her arm began to deflate. The deep ache disappeared.

A week later, she felt well enough and strong enough to go back to the courts. But the next morning she felt the familiar ache, and she knew the clot was back. Another ultrasound proved her right. Would she ever be able to play tennis again? What would prevent another blood clot the next time she played? She wasn't willing to give up the game, she told the vascular surgeons. What were her options? When patients with thoracic-outlet syndrome have a recurrence of symptoms, surgeons will often recommend simply removing the structure compressing the vein. Two weeks later the woman had surgery to take out the rib closest to her clavicle.

Recovery from that surgery took more than a month. But when she was able to play again, her game came back as strong as ever. The training that led to her injury clearly paid off on the court. Her U.S. Tennis Association rating improved — an unexpected aftermath of an unexpected ordeal. ♦

Lisa Sanders, M.D., is a contributing writer for the magazine. Her latest book is "Diagnosis: Solving the Most Baffling Medical Mysteries." If you have a solved case to share, write her at Lisa.Sandersmdnyt@gmail.com.

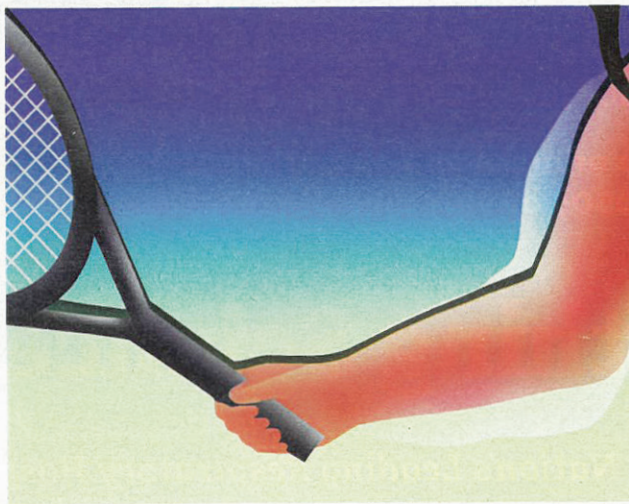


Photo illustration by Ina Jang