



The Inverted Patient

A doctor is baffled: Why did a giant man walk into the ER holding a tiny woman by her feet?

THE EMERGENCY ROOM WAS busy that afternoon. I had just started my shift and was making my way through a scrum of frantic doctors, nurses, and orderlies when I heard yelling coming from the ambulance bay entrance. "Put her down now!" I recognized the stern voice of Herb, one of our security guards.

"Get a stretcher, stat," said Ellie, the head nurse.

"You're hurting her," a woman yelled.

I ran to the ambulance bay, rounded a corner, and saw a huge man, seven-foot-something, holding a petite woman, maybe five feet tall, by her feet, her head dangling down. "I have to hold her this way," the man insisted.

"I'm fine," said the woman through her dangling long black hair. "I feel OK now."

Herb grabbed at the man's muscular arms, attempting to free the woman.

"This is my wife," the giant shouted. "Let go of me." He glared at Herb, who kept pulling at his biceps and wrists. A large group of ER personnel was now watching them from a distance.

"Let's everybody take a deep breath here," I said. "What's your name, sir?"

Herb released his grip on the man and took a step back.

"Jason," he said, more calmly now. "Okay, Jason," I said. "Why are you carrying your wife by her feet?"

"Hi, Dr. Janeira," said the upside-down woman. "Remember me?"

"No," I said. "Have we met?"

"Yes, I was here yesterday," she said. "Remember? With the slow heartbeat?"

And then it came to me. Her name was Mary, a woman in her mid-60s. She had arrived at the ER the day before with complete heart block, caused when the electrical system connecting the atria to the ventricles fails because of scarring, infection, or heart attack. As a result, the heart slows dramatically.

Mary's heart rate had been under 40 beats per minute instead of the 60 to 80 that would be considered normal in her age group. She was having recurrent fainting spells and seizures. This giant hadn't been with her then, and I had called a colleague for urgent implantation of a pacemaker, which generates rhythmic electrical pulses that prevent slowing of the heartbeat. Within minutes she had been taken from my ER to a laboratory where she was fitted for the device.

I approached the couple slowly. "I didn't expect to see you so soon," I said leaning over, trying to see her face. "Didn't you have your pacemaker implanted yesterday?"

"Yes," she said. "I had the surgery yesterday. Everything went well, and I went home this morning."

"Everything was good until about half an hour ago," Jason said. "She coughed and then collapsed."

"But I don't understand why you're

keeping her upside down," I said.

"I picked her up and put her on our bed," Jason explained. "She regained consciousness for a few seconds. She tried to get up but went out again and fell behind the bed. I picked her up by her ankles and she came to."

"I still don't get it," I said.

"If Jason puts me in bed or upright, I faint again," Mary told me. "We've tried it four times now, and every time he changes my position, I go to la-la land."

"So you're conscious upside down but not right side up?" I asked.

Mary's upside-down head nodded vigorously.

An Urgent Diagnosis

My mind raced through the possibilities. Mary could have something obstructing the blood flow from her heart to her brain that was overcome when her head was down. Or her blood pressure could be so low that blood reached the brain only when she was upside down. Blood pressure that low could have been triggered by an allergic reaction, anaphylactic shock, or severe dehydration.

Another possibility was that Mary was suffering from cardiac tamponade, a compression of the heart caused by a buildup of blood in the sac covering the organ. If her heart had been perforated during the pacemaker implantation and blood had seeped out into the sac around it, it might be that her ventricles were now being squeezed by this accumulating blood, lowering her cardiac output. That condition could improve when she was upside down by increasing blood flow to the brain.

The first thing to do was to check Mary's vital signs. "Bring her into a room," I said. "Let's get her on a monitor."

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I pointed the way, and Jason carried her into the cardiac room, an entourage of curious ER personnel trailing behind us.

Even once in the cardiac room, Jason was unconvinced that he should let go of her ankles and put her on the bed. "When I put her down, she'll go out on us," he said.

I paused for a moment. "We'll do an assessment of the vital signs first while Mary is upside down. Then we'll put her in bed and see if and how things change, OK?"

Jason nodded. Mary's long black hair waved back and forth, which I took for agreement from her, too. Ellie then placed heart monitor electrodes on her chest.

"Normal-paced rhythm," I said, watching the monitor. "The pacemaker is working perfectly fine right now."

"And I feel perfectly fine," said Mary. "Well, except that I'm upside down and have been for about 30 minutes now."

Ellie wrapped a blood pressure cuff around her arm. "It's 120 over 66," said Ellie. "Pretty good."

"OK, slowly get her on her back," I said. Jason walked closer to the bed and Ellie and I eased Mary down onto it. The only sound came from the heart monitor: beep, beep, beep, steady at 60 times a minute. We all held our breath.

Then the cardiac monitor showed a sudden change. The alarm began screaming.

"Here I go," said Mary. "It's happeni..." Her words dissolved into nothingness.

"No heart rhythm," Ellie called out. "Pacemaker failure."

"Get me epinephrine," I yelled. Also known as adrenaline, epinephrine is a hormone that can constrict blood vessels and get a stalled heart beating again.

"But we don't have an IV in yet," said Ellie.

"Out of my way," said Jason, pushing us aside to get to Mary's

feet. "I told you this would happen." The big man grabbed Mary's ankles and pulled them up in the air. Moments after Mary was upside down again, the heart monitor resumed steadily beeping.

"I'm back," said Mary.

Something must have gone wrong with her operation yesterday, I thought. Then suddenly it hit me. "The pacemaker lead, the wire going from the pacemaker generator to your right ventricle, must have disconnected. Your coughing spell could have done it," I said. "Somehow, the lead reconnects when you are upside down and continues to stimulate the heart."

Pacemakers are made up of two main components, a generator and a lead that carries electrical impulses to the heart. Often the lead tip is screwed directly into the heart muscle, but in rare cases it can dislodge and cease to stimulate the heart. Data from St. Jude Medical, one of the largest pacemaker manufacturers, show that out of about 220,000 implants of the company's most popular lead attached directly to the heart, only 97 dislodged within 30 days of implantation. Apparently, Mary was one of the rare cases.

Getting The Patient Upright

"How are we going to fix this, doc?" Jason wanted to know.

"You'll need to go back to surgery to reattach the lead," I said to Mary. "Let's page your electrophysiologist stat." I looked at Jason and sighed. "Meanwhile, keep her upside down."

We inserted an IV in Mary's arm and hooked her up to an external pacing device. But pacing her heart through her chest wall gave her severe discomfort and was not a good option, even in the short term. Moreover, it turned out that Mary's slow beat did not respond at all to medications, including intravenous epinephrine. So she was quickly transported to the electrophysiol-



ogy laboratory, dangling by her ankles, carried by the only man around with enough strength to do it. And my ER shift continued.

The next day I was back on duty. As I came out of a room after examining a small child with a fever, I heard a familiar voice behind me.

"Dr. Janeira, it's me, Mary. I'm all fixed up."

I turned and smiled at Mary and nodded at Jason, who towered massively behind her. "You were right. The pacemaker's ventricular lead had to be re-screwed in my heart," she said. "I'll be having the pacemaker checked in a few days and then every three months."

"How do you feel now?" I asked.

"Back to normal," she said. "Thanks for your help!"

And with that, she left my ER walking upright and hand-in-hand with her giant. **D**

Hanging upside down for a prolonged period of time causes blood to pool in the lungs. But some physical therapists use it as a remedy for back pain.