Doc, I think I just bruised by elbow. Do I really need to wait for x-rays?

You're late for work. You grab your bag and rush out the door. After catching the tip of your shoe on the step, you crash to the ground. Your right elbow — and your mug of coffee — land hard. The mug is broken, but what about your elbow? Just as well with the mug, since you never really liked it anyway. But your elbow? You were planning on keeping that one around for the duration.

There's no bleeding. That's good. But the elbow hurts when you touch it and it isn't moving as freely or fully as before. You can't seem to straighten it all the way out.

You take some acetaminophen, let your boss know you'll miss the morning meeting, and try to make an appointment with your doctor. No openings till tomorrow afternoon. That won't do. They direct you to the ER, where after a 25-minute wait, you meet me.

After listening to your story, I examine your elbow. The first part of my exam includes watching you move your elbow in all four directions, starting with your elbow against your torso and hanging down at your side. I ask you to extend your elbow straight down as far as you can, then flex it up to at least 90 degrees. While flexed as close to 90 degrees as possible, I ask you to fully supinate it, rotating the palm up, then fully pronate it, rotating the palm down.

Your range of motion is limited: you can neither fully extend nor fully supinate. This worries me because it raises the likelihood of a broken bone, so I order x-rays. You're not sure you want to wait for these. Your elbow is now feeling better and you can't afford to be even later to work. Plus you'd rather avoid the additional costs. Do you really need the x-rays?

Yes, you do. And our research study supports this recommendation. We wondered if there was a way to sort out which patients with recent blunt elbow injuries were at sufficient risk of having a fractured bone that x-rays should be obtained. We were curious as well if there were some patients at such low risk for a broken bone that we might be able to safely skip the x-rays.

We trained the emergency clinicians at our three hospitals how to collect the needed data. With their help we identified 251 patients 5 years of age and older with recent elbow injuries who were getting x-rays. About half of our study patients were less than 18 years old. Before the x-rays were obtained, the clinicians noted how well their patients could move their elbows in all 4 directions. The x-rays were interpreted by radiologists who were unaware about the range-of-motion results.

When we analyzed the data we found that the more limited a patient's range-of-motion, the more likely they were to have a fractured elbow. Conversely, patients who had full active elbow range of motion were very unlikely to have abnormal x-rays. In fact, of the 92 patients who had complete 4-way range of motion, only one, a 7-year-old boy, had a broken bone.

Many factors contribute to a clinician's decision to order x-rays in patients with acute elbow injuries. Our study showed that the 4-way range of motion test can contribute to this decision and help guide the prudent use of x-rays.

After understanding my rationale for ordering x-rays you decide to stick around. And we're both glad you did. Otherwise we wouldn't have identified that fracture.

David R. Vinson, MD
Department of Emergency Medicine,
Kaiser Permanente Sacramento Medical Center
Sacramento, USA

Publication

Performance of the 4-way range of motion test for radiographic injuries after blunt elbow trauma.
Vinson DR, Kann GS, Gaona SD, Panacek EA.
Am J Emerg Med. 2015 Oct 24