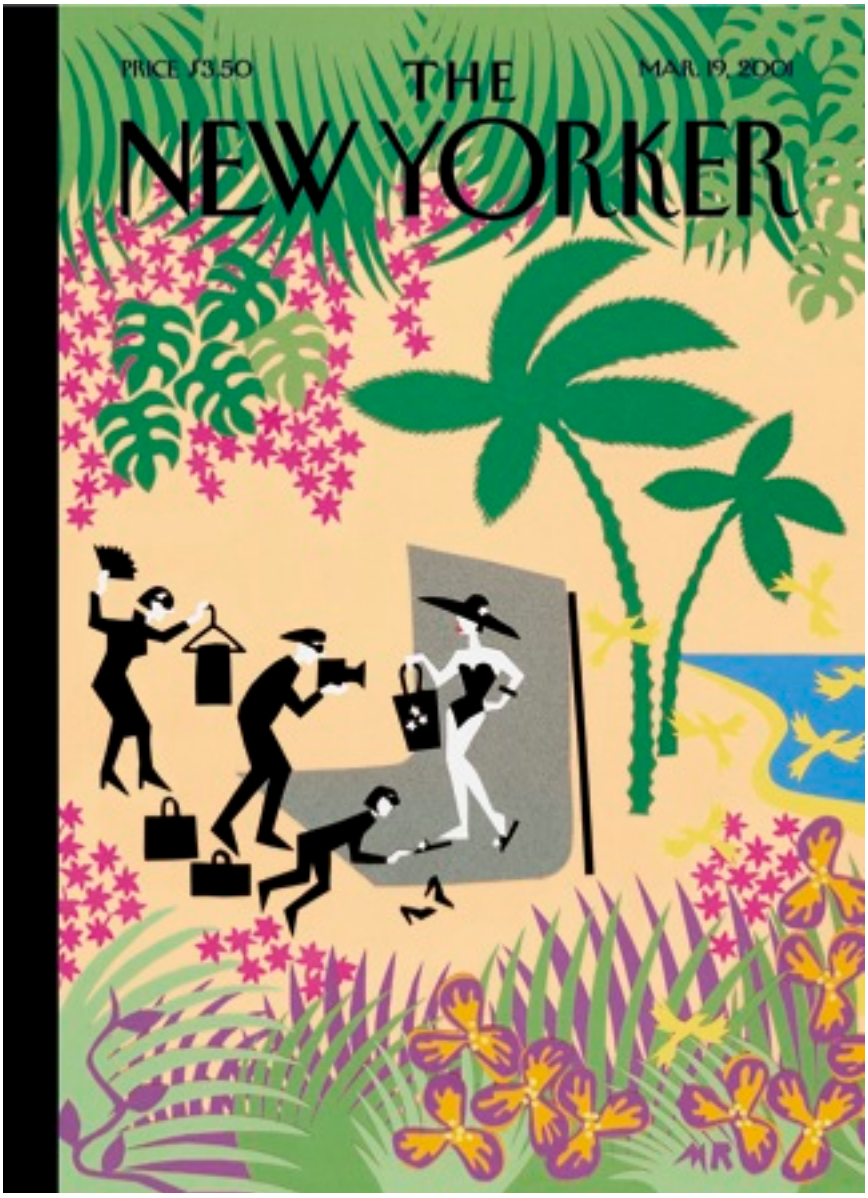
Medical Dispatch

Final Cut

Medical arrogance and the decline of the autopsy.

by Atul Gawande March 19, 2001



Autopsy studies show that doctors frequently misdiagnose the cause of death.

Your patient is dead; the family is gathered. And there is one last thing that you must ask about: the autopsy. How should you go about it? You could do it offhandedly, as if it were the most ordinary thing in the world: "Shall we do an autopsy, then?" Or you could

be firm, use your Sergeant Joe Friday voice: "Unless you have strong objections, we will need to do an autopsy, ma'am." Or you could take yourself out of it: "I am sorry, but they require me to ask, Do you want an autopsy done?"

What you can't be these days is mealy-mouthed about it. I once took care of a woman in her eighties who had given up her driver's license only to get hit by a car—driven by someone even older—while she was walking to a bus stop. She sustained a depressed skull fracture and cerebral bleeding, and, despite surgery, she died a few days later. So, on the spring afternoon after the patient took her last breath, I stood beside her and bowed my head with the tearful family. Then, as delicately as I could—not even using the awful word—I said, "If it's all right, we'd like to do an examination to confirm the cause of death."

"An *autopsy*?" a nephew said, horrified. He looked at me as if I were a buzzard circling his aunt's body. "Hasn't she been through enough?"

The autopsy is in a precarious state. A generation ago, it was routine; now it has become a rarity. Human beings have never quite become comfortable with the idea of having their bodies cut open after they die. Even for a surgeon, the sense of violation is inescapable.

Not long ago, I went to observe the dissection of a thirty-eight-year-old woman I had taken care of who had died after a long struggle with heart disease. The dissecting room was in the sub-basement, past the laundry and a loading dock, behind an unmarked metal door. It had high ceilings, peeling paint, and a brown tiled floor that sloped down to a central drain. There was a Bunsen burner on a countertop, and an old-style grocer's hanging scale, with a big clock-face red-arrow gauge and a pan underneath, for weighing organs. On shelves all around the room there were gray portions of brain, bowel, and other organs soaking in formalin in Tupperware-like containers. The facility seemed run-down, chintzy, low-tech. On a rickety gurney in the corner was my patient, sprawled out, completely naked. The autopsy team was just beginning its work.

Surgical procedures can be grisly, but dissections are somehow worse. In even the most gruesome operations—skin-grafting, amputations—surgeons maintain an attitude of tenderness and aestheticism toward their work. We know that the bodies we cut still pulse with life, and that these are people who will wake again. But in the dissecting room, where the person is gone and only the carcass remains, you find little of this delicacy, and the difference is visible in the smallest details. There is, for example, the simple matter of how a body is moved from gurney to table. In the operating room, we follow a careful, elaborate procedure for the unconscious patient, involving a canvas-sleeved rolling board and several gentle movements. We don't want so much as a bruise. Down here, by contrast, someone grabbed my patient's arm, another person a leg, and they just yanked. When her skin stuck to the stainless-steel dissecting table, they had to wet her and the table down with a hose before they could jerk her the rest of the way.

The young pathologist for the case stood on the sidelines and let a pathology assistant take the knife. Like many of her colleagues, the pathologist had not been drawn to her field by autopsies but by the high-tech detective work that she got to do on tissue from living patients. She was happy to leave the dissection to the P.A., who had more experience at it anyway.

The P.A. was a tall, slender woman of around thirty with straight sandy-brown hair. She was wearing the full protective garb of mask, face shield, gloves, and blue plastic gown. Once the body was on the table, she placed a six-inch metal block under the back, between the shoulder blades, so that the head fell back and the chest arched up. Then she took a scalpel in her hand, a big No. 6 blade, and made a huge Y-shaped incision that came down diagonally from each shoulder, curving slightly around each breast before reaching the midline, and then continued down the abdomen to the pubis.

Surgeons get used to the opening of bodies. It is easy to detach yourself from the person on the table and become absorbed by the details of method and anatomy. Nevertheless, I couldn't help wincing as she did her work: she was holding the scalpel like a pen, which forced her to cut slowly and jaggedly with the tip of the blade. Surgeons are taught to stand straight and parallel to their incision, hold the knife between the thumb and four fingers, like a violin bow, and draw the belly of the blade through the skin in a single, smooth slice to the exact depth desired. The P.A. was practically sawing her way through my patient.

From there, the evisceration was swift. The P.A. flayed back the skin flaps. With an electric saw, she cut through the exposed ribs along both sides. Then she lifted the rib cage as if it were the hood of a car, opened the abdomen, and removed all the major organs—including the heart, the lungs, the liver, the bowels, and the kidneys. Then the skull was sawed open, and the brain, too, was removed. Meanwhile, the pathologist was at a back table, weighing and examining everything, and preparing samples for microscopy and thorough testing.

Despite all this, the patient came out looking surprisingly undisturbed. The P.A. had followed the usual procedure and kept the skull incision behind the woman's ears, where it was completely hidden by her hair. She had also taken care to close the chest and abdomen neatly, sewing the incision tightly with weaved seven-cord thread. My patient actually looked much the same as before, except now a little collapsed in the middle. (The standard consent allows the hospital to keep the organs for testing and research. This common and long-established practice is now causing huge controversy in Britain—the media have branded it "organ stripping"—but in America it remains generally accepted.) Families can still have an open-casket funeral, and most do. Morticians employ fillers to restore a corpse's shape, and when they're done you cannot tell that an autopsy has been performed.

Still, when it is time to ask for a family's permission to do such a thing, the images weigh on everyone's mind—not least the doctor's. You strive to achieve a cool, dispassionate attitude toward these matters. But doubts nevertheless creep in.

One of the first patients for whom I was expected to request an autopsy was a seventy-five-year-old retired New England doctor who died one winter night while I was with him. Herodotus Sykes (not his real name, but not unlike it, either) had been rushed to the hospital with an infected, rupturing abdominal aortic aneurysm and taken to emergency surgery. He survived it, and recovered steadily until, eighteen days later, his blood pressure dropped alarmingly and blood began to pour from a drainage tube in his abdomen. "The aortic stump must have blown out," his surgeon said. Residual infection must have weakened the suture line. We could have operated again, but the patient's chances were poor, and his surgeon didn't think he would be willing to take any more.

He was right. No more surgery, Sykes told me. He'd been through enough. We called Mrs. Sykes, who was staying with a friend, about two hours away, and she set out for the hospital.

It was about midnight. I sat with him as he lay silent and bleeding, his arms slack at his sides, his eyes without fear. I imagined his wife out on the Mass Pike, frantic, helpless, with six lanes, virtually empty at that hour, stretching far ahead.

Sykes held on, and at 2:15 a.m. his wife arrived. She turned ashen at the sight of him, but she steadied herself. She gently took his hand in hers. She squeezed, and he squeezed back. I left them to themselves.

At two-forty-five, the nurse called me in. I listened with my stethoscope, then turned to Mrs. Sykes and told her that he was gone. She had her husband's Yankee reserve, but she broke into quiet tears, weeping into her hands, and seemed suddenly frail and small. A friend who had come with her soon appeared, took her by the arm, and led her out of the room.

We are instructed to request an autopsy on everyone as a means of confirming the cause of death and catching our mistakes. And this was the moment I was supposed to ask—with the wife despondent and reeling with shock. But surely, I began to think, here was a case in which an autopsy would be pointless. We knew what had happened—a persistent infection, a rupture. We were sure of it. What would cutting the man apart accomplish?

And so I let Mrs. Sykes go. I could have caught her as she walked through the I.C.U.'s double doors. Or even called her on the phone later. But I never did.

Such reasoning, it appears, has become commonplace in medicine. Doctors are seeking so few autopsies that in recent years *The Journal of the American Medical Association* has twice felt the need to declare "war on the nonautopsy." According to the most recent statistics available, autopsies have been done in less than ten per cent of deaths; many hospitals do none. This is a dramatic turnabout. Through much of the twentieth century, doctors diligently obtained autopsies in the majority of all deaths— and it had taken centuries to reach this point. As Kenneth Iserson recounts in his fascinating almanac, "Death to Dust," physicians have performed autopsies for more than two thousand years. But for most of history they were rarely performed, and only for legal purposes (if

religions permitted them at all—Islam, Shinto, and the Greek Orthodox Church still frown on them). The Roman physician Antistius performed one of the earliest forensic examinations on record, in 44 B.C., on Julius Caesar, documenting twenty-three wounds, including a final, fatal stab to the chest. In 1410, the Catholic Church itself ordered an autopsy—on Pope Alexander V, to determine whether his successor had poisoned him. No evidence of this was found.

Even in the nineteenth century, long after church strictures had loosened, people in the West rarely allowed doctors to autopsy their family members for medical purposes. As a result, the practice was largely clandestine. Some doctors went ahead and autopsied hospital patients immediately after death, before relatives could turn up to object. Others waited until burial and then robbed the graves, either personally or through accomplices, an activity that continued into the twentieth century. To deter such autopsies, some families would post nighttime guards at the grave site—hence the term "graveyard shift." Others placed heavy stones on the coffins. In 1878, one company in Columbus, Ohio, even sold "torpedo coffins," equipped with pipe bombs rigged to blow up if they were tampered with. Yet doctors remained undeterred. Ambrose Bierce's "The Devil's Dictionary," published in 1906, defined "grave" as "a place in which the dead are laid to await the coming of the medical student."

By the turn of the century, however, prominent physicians such as Rudolf Virchow, in Berlin, Karl Rokitansky, in Vienna, and William Osler, in Baltimore, began to win popular support for the practice. They defended it as a tool of discovery, one that was used to identify the cause of tuberculosis, reveal how to treat appendicitis, and establish the existence of Alzheimer's disease. They showed that autopsies prevented errors—that without them doctors could not know when their diagnoses were incorrect. Most deaths were a mystery then, and perhaps what clinched the argument was the notion that autopsies could provide families with answers—give the story of a loved one's life a comprehensible ending. Once doctors had insured a dignified and respectful dissection at the hospital, public opinion turned. With time, doctors who did *not* obtain autopsies were viewed with suspicion. By the end of the Second World War, the autopsy was firmly established as a routine part of death in Europe and North America.

So what accounts for its decline? It's not because families refuse—to judge from recent studies, they still grant that permission up to eighty per cent of the time. Doctors, once so eager to perform autopsies that they stole bodies, have simply stopped asking. Some people ascribe this to shady motives. It has been said that hospitals are trying to save money by avoiding autopsies, since insurers don't pay for them, or that doctors avoid them in order to cover up evidence of malpractice. And yet autopsies lost money and uncovered malpractice when they were popular, too.

Instead, I suspect, what discourages autopsies is medicine's twenty-first-century, tall-in-the-saddle confidence. When I failed to ask Mrs. Sykes whether we could autopsy her husband, it was not because of the expense, or because I feared that the autopsy would uncover an error. It was the opposite: I didn't see much likelihood that an error would be found. Today, we have M.R.I. scans, ultrasound, nuclear medicine, molecular testing, and

much more. When somebody dies, we already know why. We don't need an autopsy to find out.

Or so I thought. Then I had a patient who changed my mind.

He was in his sixties, whiskered and cheerful, a former engineer who had found success in retirement as an artist. I will call him Mr. Jolly, because that's what he was. He was also what we call a vasculopath—he did not seem to have an undiseased artery in him. Whether because of his diet or his genes or the fact that he used to smoke, he had had, in the previous decade, one heart attack, two abdominal aortic-aneurysm repairs, four bypass operations to keep blood flowing past blockages in his leg arteries, and several balloon procedures to keep hardened arteries open. Still, I never knew him to take a dark view of his lot. "Well, you can't get miserable about it," he'd say. He had wonderful children. He had beautiful grandchildren. "But, aargh, the wife," he'd go on. She would be sitting right there at the bedside, and would roll her eyes, and he'd break into a grin.

Mr. Jolly had come into the hos- pital for treatment of a wound infection in his legs. But he soon developed congestive heart failure, causing fluid to back up into his lungs. Breathing became steadily harder for him, until we had to put him in the I.C.U., intubate him, and place him on a ventilator. A two-day admission turned into two weeks. With a regimen of diuretics and a change in heart medications, however, his heart failure reversed, and his lungs recovered. And one bright Sunday morning he was reclining in bed, breathing on his own, watching the morning shows on the TV set that hung from the ceiling. "You're doing marvellously," I said. I told him we would transfer him out of intensive care by the afternoon. He would probably be home in a couple of days.

Two hours later, a code-blue call went out on the overhead speakers. When I got to the I.C.U. and saw the nurse hunched over Mr. Jolly, doing chest compressions, I blurted out an angry curse. He'd been fine, the nurse explained, just watching TV, when suddenly he sat upright with a look of shock and then fell back, unresponsive. At first, he was asystolic—no heart rhythm on the monitor—and then the rhythm came back, but he had no pulse. A crowd of staffers set to work. I had him intubated, gave him fluids and epinephrine, had someone call the attending surgeon at home, someone else check the morning lab-test results. An X-ray technician shot a portable chest film.

I mentally ran through possible causes. There were not many. A collapsed lung, but I heard good breath sounds with my stethoscope, and when his X-ray came back the lungs looked fine. A massive blood loss, but his abdomen wasn't swelling, and his decline happened so quickly that bleeding just didn't make sense. Extreme acidity of the blood could do it, but his lab tests were fine. Then there was cardiac tamponade—bleeding into the sac that contains the heart. I took a six-inch spinal needle on a syringe, pushed it through the skin below the breastbone, and advanced it to the heart sac. I found no bleeding. That left only one possibility: a pulmonary embolism—a blood clot that flips into the lung and instantly wedges off all blood flow. And nothing could be done about that.

I went out and spoke to the attending surgeon by phone and then to the chief resident, who had just arrived. An embolism was the only logical explanation, they agreed. I went back into the room and stopped the code. "Time of death: 10:23 A.M.," I announced. I phoned his wife at home, told her that things had taken a turn for the worse, and asked her to come in.

This shouldn't have happened; I was sure of it. I scanned the records for clues. Then I found one. In a lab test done the day before, the patient's clotting had seemed slow, which wasn't serious, but an I.C.U. physician had decided to correct it with vitamin K. A frequent complication with vitamin K is blood clots. I was furious. Giving the vitamin was completely unnecessary—just fixing a number on a lab test. Both the chief resident and I lit into the physician. We all but accused him of killing the patient.

When Mrs. Jolly arrived, we took her to a family room where it was quiet and calm, with table lamps instead of fluorescent lights and soft, plump chairs. I could see from her face that she'd already surmised the worst. His heart had stopped suddenly, we told her, because of a pulmonary embolism. We said the medicines we gave him may have contributed to it. I took her in to see him and left her with him. After a while, she came out, her hands trembling and her face stained with tears. Then, remarkably, she thanked us. We had kept him for her all these years, she said. Maybe so, but neither of us felt any pride about what had just happened.

I asked her the required question. I told her that we wanted to perform an autopsy and needed her permission. We thought we already knew what had happened, but an autopsy would confirm it, I said. She considered my request for a moment. If an autopsy would help us, she finally said, then we could do it. I said, as I was supposed to, that it would. I wasn't sure I believed it.

I wasn't assigned to the operating room the following morning, so I went down to observe the autopsy. When I arrived, Mr. Jolly was already laid out on the dissecting table, his arms splayed, skin flayed back, chest exposed, abdomen open. I put on a gown, gloves, and a mask, and went up close. The P.A. began buzzing through the ribs on the left side with the electric saw, and immediately blood started seeping out, as dark and viscous as crankcase oil. Puzzled, I helped him lift open the rib cage. The left side of the chest was full of blood. I felt along the pulmonary arteries for a hardened, embolized clot, but there was none. He hadn't had an embolism after all. We suctioned out three litres of blood, lifted the left lung, and the answer appeared before our eyes. The thoracic aorta was almost three times larger than it should have been, and there was a half-inch hole in it. The man had ruptured an aortic aneurysm and had bled to death almost instantly.

In the days afterward, I apologized to the physician I'd reamed out over the vitamin, and pondered how we had managed to miss the diagnosis. I looked back through the patient's old X-rays and now saw a shadowy outline of what must have been his aneurysm. But none of us, not even the radiologists, had caught it. Even if we had caught it, we wouldn't have dared to do anything about it until weeks after treating his infection and heart

failure, and that would have been too late. It disturbed me, however, to have felt so confident about what had happened that day and to have been so wrong.

The most perplexing thing was his final chest X-ray, the one we had taken during the code blue. With all that blood filling the chest, I should have seen at least a haze over the left side. But when I pulled the film out to look again there was nothing.

How often do autopsies turn up a major misdiagnosis in the cause of death? I would have guessed this happened rarely, in one or two per cent of cases at most. According to three studies done in 1998 and 1999, however, the figure is about forty per cent. A large review of autopsy studies concluded that in about a third of the misdiagnoses the patients would have been expected to live if proper treatment had been administered. George Lundberg, a pathologist and former editor of *The Journal of the American Medical Association* who has done more than anyone to call attention to these figures, points out the most surprising fact of all: the rates at which misdiagnosis is detected have not improved in autopsy studies since at least 1938.

With all the recent advances in imaging and diagnostics, it's hard to accept that we not only get the diagnosis wrong in two out of five of our patients who die but that we have also failed to improve over time. To see if this could really be true, doctors at Harvard put together a simple study. They went back into their hospital records to see how often autopsies picked up missed diagnoses in 1960 and 1970, before the advent of CT, ultrasound, nuclear scanning, and other technologies, and then in 1980, after they became widely used. The researchers found no improvement. Regardless of the decade, physicians missed a quarter of fatal infections, a third of heart attacks, and almost two-thirds of pulmonary emboli in their patients who died.

In most cases, it wasn't technology that failed. Rather, the physicians did not consider the correct diagnosis in the first place. The perfect test or scan may have been available, but the physicians never ordered it.

In a 1976 essay, the philosophers Samuel Gorovitz and Alasdair MacIntyre explored the nature of fallibil- ity. Why would a meteorologist, say, fail to correctly predict where a hurricane was going to make landfall? They saw three possible reasons. One was ignorance: perhaps science affords only a limited understanding of how hurricanes behave. A second reason was ineptitude: the knowledge is available, but the weatherman fails to apply it correctly. Both of these are surmountable sources of error. We believe that science will overcome ignorance, and that training and technology will overcome ineptitude. The third possible cause of error the philosophers posited, however, was an insurmountable kind, one they termed "necessary fallibility."

There may be some kinds of knowledge that science and technology will never deliver, Gorovitz and MacIntyre argued. When we ask science to move beyond explaining how things (say, hurricanes) generally behave to predict- ing exactly how a particular thing (say, Thursday's storm off the South Carolina coast) will behave, we may be asking it to do more than it can. No hurricane is quite like any other hurricane. Although all

hurricanes follow predictable laws of behavior, each one is continuously shaped by myriad uncontrollable, accidental factors in the environment. To say precisely how one specific hurricane will behave would require a complete understanding of the world in all its particulars—in other words, omniscience.

It's not that it's impossible to predict anything; plenty of things are completely predictable. Gorovitz and MacIntyre give the example of a random ice cube in a fire. Ice cubes are so simple and so alike that you can predict with complete assurance that an ice cube will melt. But when it comes to inferring exactly what is going on in a particular person, are people more like ice cubes or like hurricanes?

Right now, at about midnight, I am seeing a patient in the emergency room, and I want to say that she is an ice cube. That is, I believe I can understand what's going on with her, that I can discern all her relevant prop- erties. I believe I can help her.

Charlotte Duveen, as we will call her, is forty-nine years old, and for two days she has had abdominal pain. I began observing her from the moment I walked through the curtains into her room. She was sitting cross-legged in the chair next to her stretcher and greeted me with a cheerful, tobacco-beaten voice. She did not look sick. No clutching the belly. No gasping for words. Her color was good—neither flushed nor pale. Her shoulder-length brown hair had been brushed, her red lipstick neatly applied.

She told me the pain had started out crampy, like a gas pain. But then, during the course of the day, it had become sharp and focussed, and as she said this she pointed to a spot on the lower right side of her abdomen. She had developed diarrhea. She constantly felt as if she had to urinate. She didn't have a fever. She was not nauseated. Actually, she was hungry. She told me that she had eaten a hot dog at Fenway Park two days ago, and she asked if that might have anything to do with this. She had also seen the birds at the zoo a few days earlier. She has two grown children. Her last period was three months ago. She smokes half a pack a day. She used to use heroin but said she's clean now. She once had hepatitis. She has never had surgery.

I felt her abdomen. It could be anything, I thought: food poisoning, a virus, appendicitis, a urinary-tract infection, an ovarian cyst, a pregnancy. Her abdomen was soft, without distension, and there was an area of particular tenderness in the lower right quadrant. When I pressed there, I felt her muscles harden reflexively beneath my fingers. On the pelvic exam, her ovaries felt normal. I ordered some lab tests. Her white-blood-cell count came back elevated. Her urinalysis was normal. A pregnancy test was negative. I ordered an abdominal CT scan.

I am sure I can figure out what's wrong with her, but, if you think about it, that's a curious faith. I have never seen this woman before in my life, and yet I presume that she is like the others I've examined. Is it true? None of my other patients, admittedly, were forty-nine-year-old women who had had hepatitis and a drug habit, had recently been to the zoo and eaten a Fenway frank, and had come in with two days of mild lower-right-quadrant pain. Yet I still believe. Every day, we take people to surgery and open their

abdomens, and, broadly speaking, we know what we will find: not eels or tiny chattering machines or a pool of blue liquid but coils of bowel, a liver to one side, a stomach to the other, a bladder down below. There are, of course, differences—an adhesion in one patient, an infection in another—but we have catalogued and sorted them by the thousands, making a statistical profile of mankind.

I am leaning toward appendicitis. The pain is in the right place. The timing of her symptoms, her exam, and her white-blood-cell count all fit with what I've seen before. She's hungry, however; she's walking around, not looking sick, and this seems unusual. I go to the radiology reading room and stand in the dark, looking over the radiologist's shoulder at the images of Duveen's abdomen flashing up on the monitor. He points to the appendix, wormlike, thick, surrounded by gray, streaky fat. It's appendicitis, he says confidently. I call the attending surgeon on duty and tell him what we've found. "Book the O.R.," he says. We're going to do an appendectomy.

This one is as sure as we get. Yet I've worked on similar cases—with identi- cal results from the CT scan—in which we opened the patient up and found a normal appendix. Surgery itself is a kind of autopsy. "Autopsy" literally means "to see for oneself, " and, despite our knowledge and technology, when we look we're often unprepared for what we find. I want to think that my pa- tient's condition is as predictable as the sun's rising, as the melting of an ice cube, and maybe I have to. But I've been around long enough to know that in human beings the simplest certainties can be dashed.

Whether with living patients or cadavers, we do not know until we look. Even in Mr. Sykes's case, I now won- der whether we put our stitches in correctly, or whether the bleeding had come from somewhere else entirely. Doctors are no longer asking these questions. And our arrogance only deepens. In 1995, the National Center for Health Statistics stopped collecting autopsy statistics altogether. We can no longer even say how rare autopsies have become. ♦