

# **Medical Errors: How and Why Good Doctors Make Bad Mistakes**

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# Background

- In addition to practicing, investigating and teaching Oncology for thirty-four years I have served from time to time as a consultant to the legal profession in matters of complex cancer litigation – typically in allegations of medical negligence leading to a bad outcome or damages related to dangerous products or substances



# Background, continued

- I have found “teachable moments” in some of these cases, wherein we can all stand to benefit by a retrospective review of the mistakes of others
- I bring some of these moments to you this morning with suggestions for how we can all learn from the mistakes of others
- Can these moments serve as a starting point for a more general discussion about medical errors?



# Case #1: Are All Brain Masses Cancer?

- 43 year-old previously healthy man awoke one morning unable to talk
- He was taken to the local hospital where a CT scan in the ED showed several ring-enhancing lesions in his brain and an infiltrate in his right lower lobe
- He was admitted with presumptive diagnosis of lung cancer with brain metastases and started on steroids with return of speech

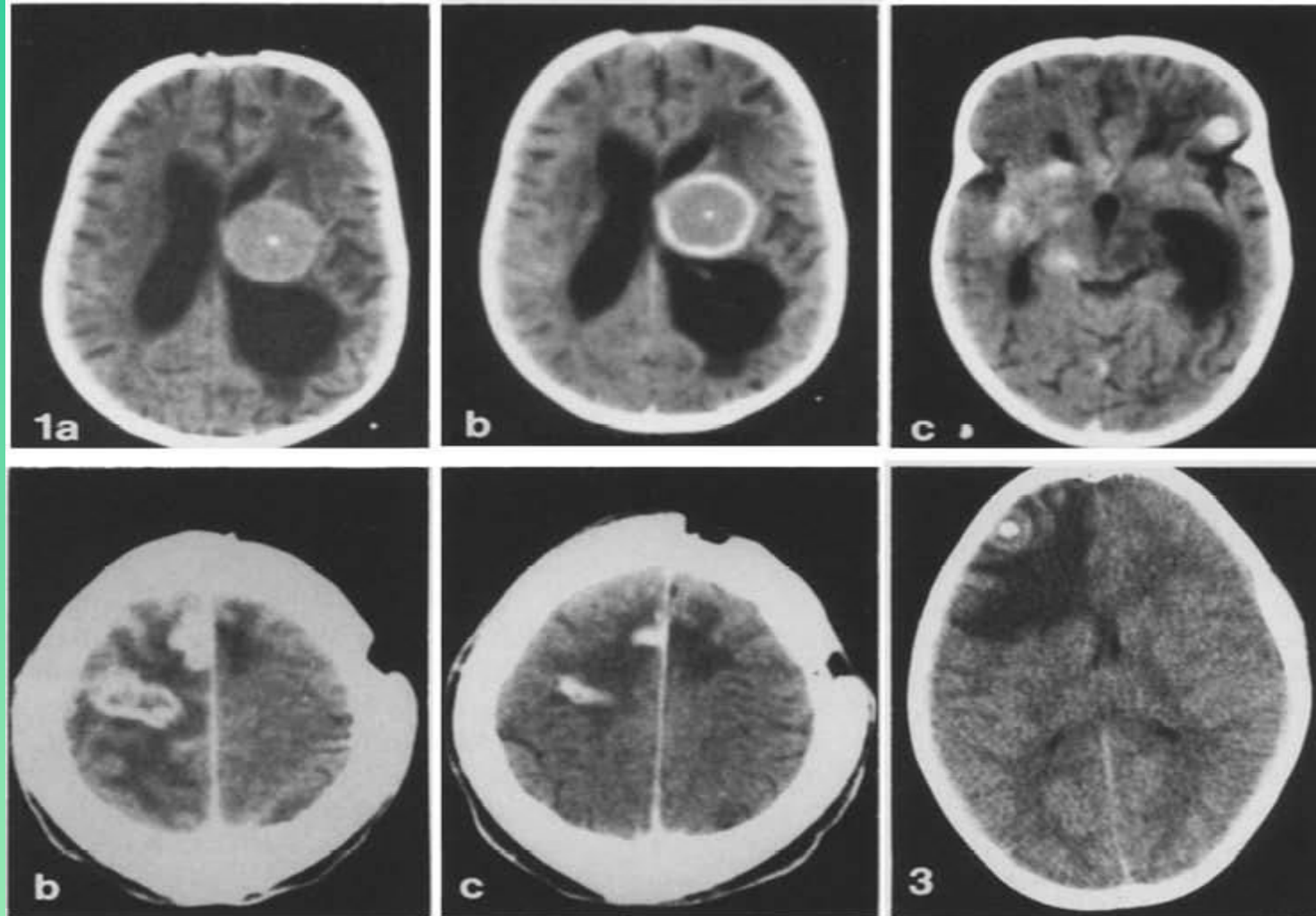


# Case #1, continued

- He was admitted by the hospitalist on call, then seen by numerous consultants
- Two lung biopsies showed inflammation but no cancer
- He was sent home without a diagnosis on steroids, told to see the Oncologist who had seen him once as an outpatient, but no definite appointment was made
- He returned ten days later having seen no doctor in the interim with recurrent aphasia
- CT repeated...



# Second CT Scan



# Case, continued

- Because of deteriorating neurologic condition and worsening of CT findings a neurosurgeon was consulted
- He was taken to surgery where a burr hole was made and frank pus spurted out of the hole
- Diagnosis switched to pneumonia with multiple brain abscesses
- Started on empiric antibiotics awaiting culture results, which eventually grew a staph species
- Brain lesions gradually reduced in size but his speech never returned



# Case, continued

- Three years later he remains aphasic and is totally disabled for gainful employment and for his role within his family
- His family sued all of the doctors involved in his care and the hospital as well
- Each doctor had a different lawyer; I was retained by the attorney for the Oncologist who saw him once during the first admission and who was supposed to see him after discharge but did not





# The Trial

- I was able to convince the jury that the Oncologist played no role in the bad outcome and he was acquitted of wrongdoing
- The other doctors were all found negligent and the plaintiff was awarded several million dollars in damages



# The Analysis

- What went wrong? How did all the doctors miss the diagnosis?
  - The man was a non-smoker who had no other exposures to suspected carcinogens
  - On the other hand he had no known risk factors for brain abscess, i.e., an immunocompromised state
    - Despite my suggestion the defense team did not insist he be HIV tested prior to the trial; little came out about his social life during the trial; no investigation of potential secretive anti-social behavior was undertaken



# What Went Wrong, continued

- The Handoff:
  - The patient was discharged on a Friday (after the second lung biopsy but before anyone knew it was normal) by the hospitalist who was under pressure from administration to keep length of stay to a minimum
  - The Oncologist who was supposed to follow up saw the patient only once during the admission and was not aware that care was being transferred to him
  - The PCP, who had given up hospital work, was never called by the hospitalist at discharge to alert him to his ill patient being sent back to the community



# What Further Went Wrong

- The physicians in charge of his care committed a common error known as “confirmation bias” wherein unlikely diagnoses are screened out subconsciously as a form of cognitive dissonance
  - Metastatic disease to the brain in the patient with an intact immune system is orders of magnitude more common than brain abscesses
  - The doctors ignored the less common diagnosis despite the man’s age and his smoking status even though the consequences of ignoring that diagnosis could be devastating



# What Else Went Wrong

- The initial CT scan was read as showing “...most likely multiple brain metastases; remotely consider multiple abscesses in the proper clinical setting.”
- None of the treating physicians actually looked at the scan
- When I finally saw the CT for the first time at trial, I saw images that looked nothing like the typical cancer.....I hadn't seen the scans either



# A Teachable Moment?

- Clearly, and with benefit of hindsight, all the facts did not line up for a likely diagnosis of lung cancer, especially after two negative lung biopsies
- The consequences of being wrong in this setting were grave
- Arguably too many doctors with a blurred chain of command all fell back on the obvious diagnosis, without having a stake in the consequences of being wrong

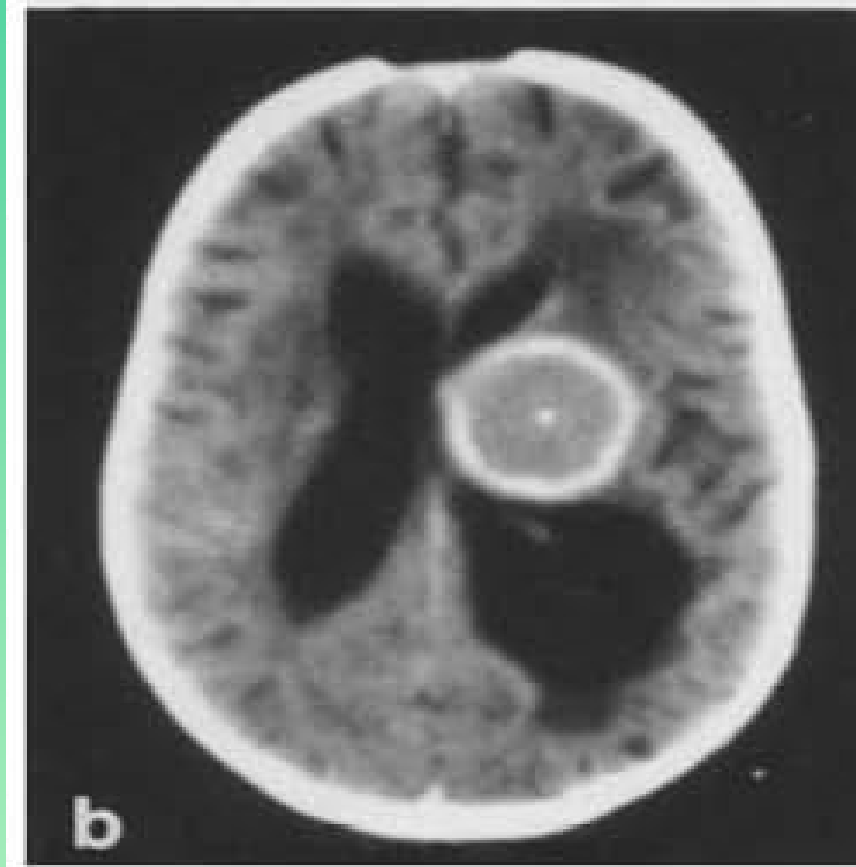


# My Teachable Moment

- I had committed the error known as “disregard of uncertainty” as well by not insisting on seeing the CT scan for myself rather than on relying on the radiology report and the thoroughness of the lawyer who had hired me

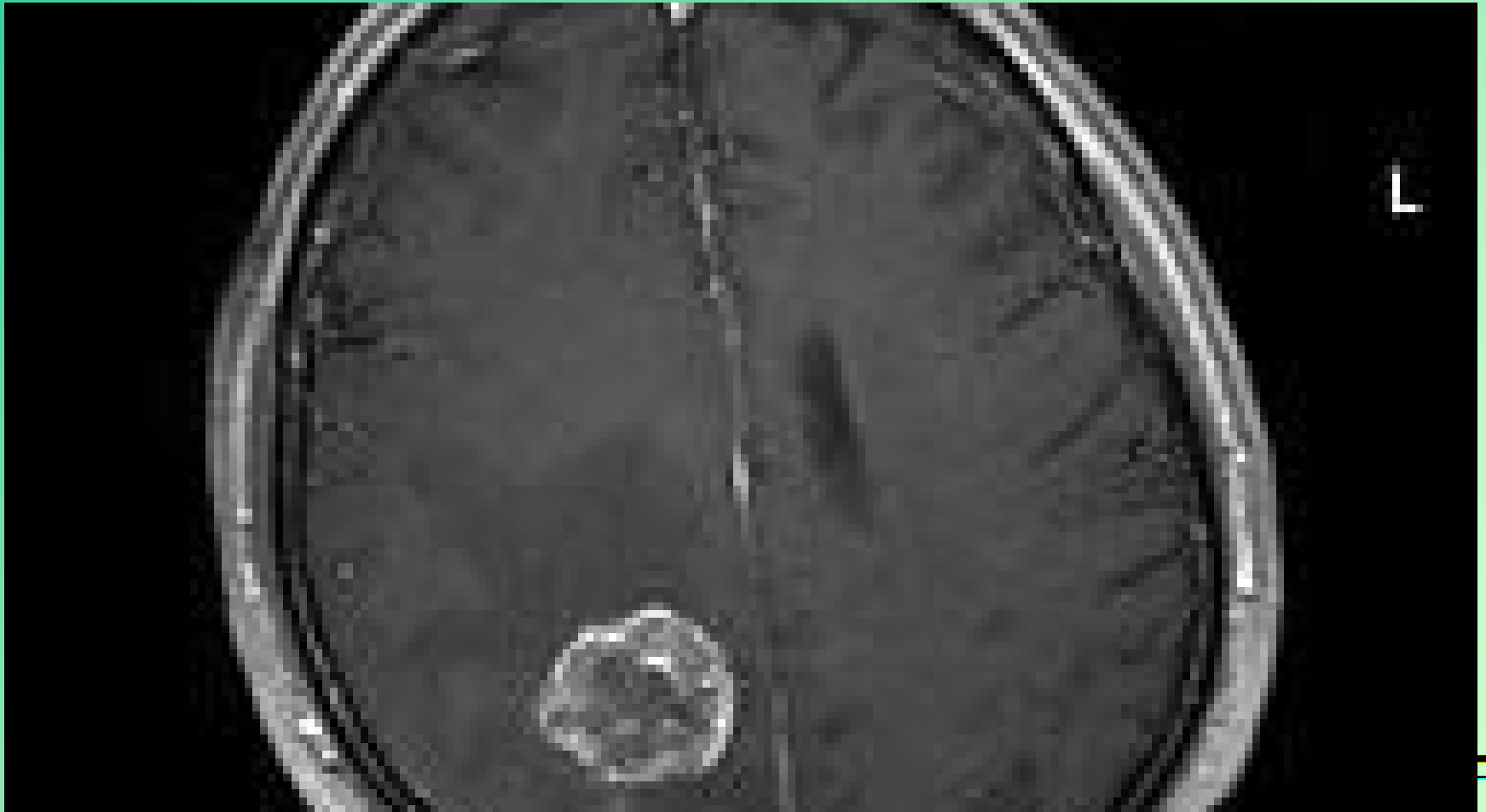


# Second CT Scan





# Typical Brain Metastasis from Lung Cancer



# How Could A Better Outcome Have Resulted?

- None of the doctors involved made the correct diagnosis the first time around
- Arguably if no one could figure out what was wrong they should have found someone who could
- The hospital to which the patient was admitted is a small community hospital in a small city, but with ties to a major academic institution ninety miles away to which our patient could have been transferred
- Discharging a patient because he was a little better and the weekend was coming was no substitute for a real diagnosis and treatment plan



## Case 2: “The Knee Bone’s Connected to the Thigh Bone...”

- A 24 year-old woman passed up the opportunity to play professional soccer to enter medical school with the hope of becoming an orthopedic surgeon
- During her second year of medical school she joined an amateur soccer league as the only female player
- Near the end of the season during a game she tore her left anterior cruciate ligament



# Case, continued

- After a period of self-managed physical therapy she sought professional help from the Chairman of Orthopedics at her medical school
- An MRI confirmed the diagnosis and he recommended surgery
- Not disclosed to her, the surgeon planned to use a new device to stabilize her knee during the repair



# Case, continued

- Also not disclosed, the surgeon was a paid consultant to the surgical device company that held the patent on the new instrument
  - That relationship required that he learn to use the new instrument, actually use it for ACL repairs, then teach others how to use it
  - His only experience with the tool had been as a visitor to the OR of a surgeon who had already mastered use of the new device

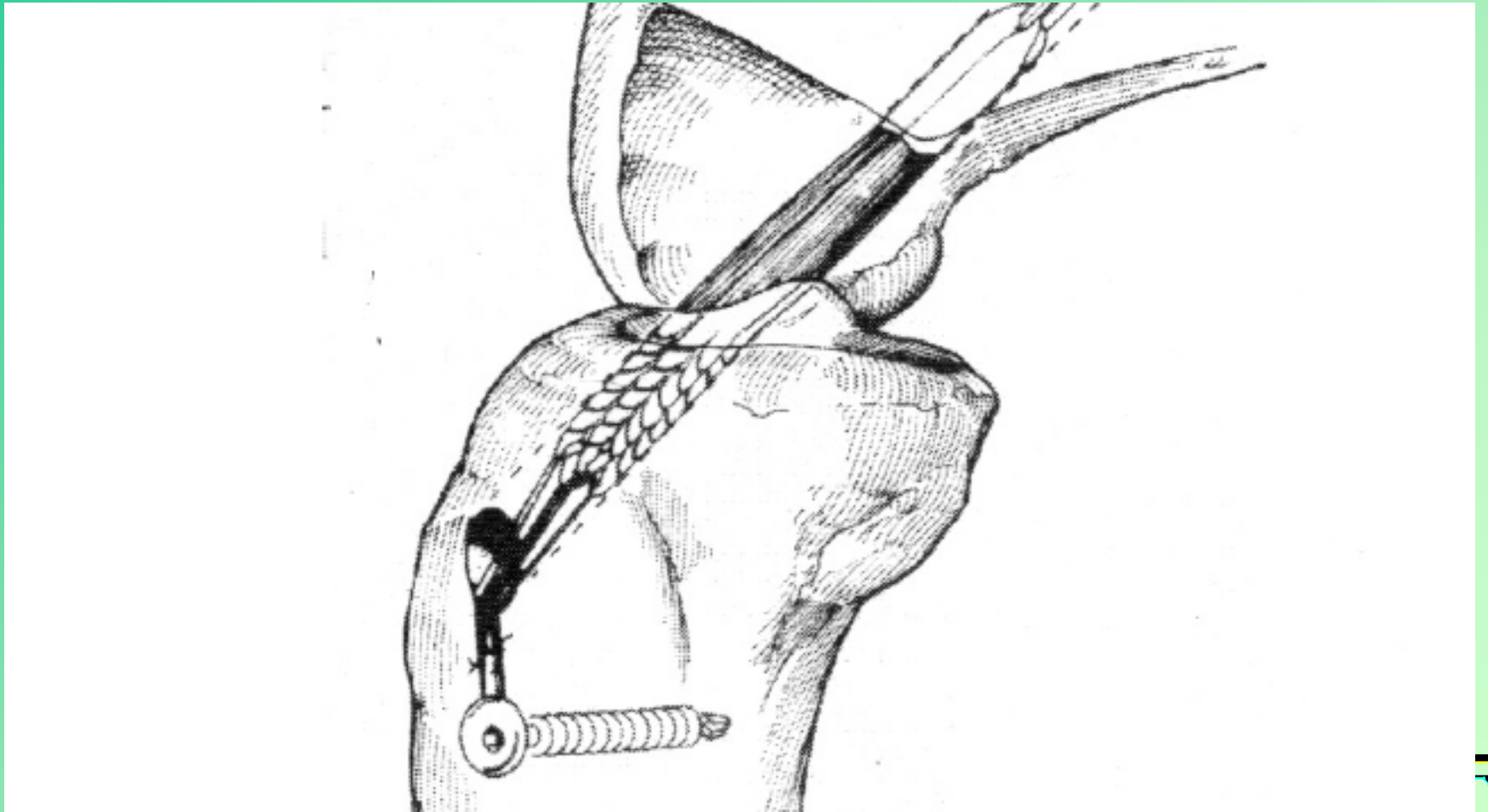


# The Operation

- The surgery to repair the ACL went well, according to the operative note and subsequent testimony
- Unknown to the surgeon, during the case he had accidentally put the screw used to attach the graft through the head of the tibia into the popliteal artery; the new device had a longer screw than he was accustomed to using
- The artery did not leak and at the end of the case a plain x-ray done to confirm the position of the hardware offered no clue as to what had happened



# Screw Placement as Part of ACL repair



**The Endobutton Fixation System,  
from Smith & Nephew**



# The Post-Operative Period

- After the surgery the patient had the expected pain for about a day
- On day three, she began to experience excruciating pain in her ipsilateral lower leg and foot and noticed that her foot was discolored and cool
- In the ED it was obvious to the doctors that she had severe ischemic changes in her foot





# The Work Up

- Doppler studies showed markedly diminished arterial flow below the knee
- An arteriogram showed the screw penetrating the popliteal artery
- She was taken back to surgery to have the ACL repair revised and undergo repair of her popliteal artery by a vascular surgeon
- Over the next several days she returned to the operating room several times because the popliteal artery kept clotting



# Further Convalescence

- Finally after adequate but subnormal blood flow was reestablished to her foot she was discharged on aspirin and plavix
- Because she had continued foot and lower leg pain she sought a second opinion from a vascular surgeon at another medical school



# The Second Opinion

- The new vascular surgeon took a history, examined her and repeated the non-invasive studies, which showed continued diminished blood flow to her foot
- Based on the story he decided to consult a hematologist to evaluate the possibility of an underlying clotting disorder
- The hematologist, also impressed by her story, ordered a series of clotting studies



# The Clotting Studies

- Routine clotting studies (PT, PTT, fibrinogen, platelet count) were normal
- Because she was on aspirin and plavix platelet aggregation and adhesiveness could not be tested
- She had two abnormalities:
  - Heterozygosity for the Factor V Leiden mutation
  - Mildly positive anti-phospholipid antibodies



# A word on the clotting disorders

- Factor V Leiden mutation occurs in the heterozygous form in 2-5% of the general population and is generally asymptomatic unless another propensity to clot develops (e.g., birth control pills, major surgery)
- Anti-phospholipid antibodies occur with lupus or as an isolated finding, typically in young women, and can be asymptomatic or associated with catastrophic thrombophilia



# Thrombophilia, continued

- When two mild to moderate causes of increased clotting occur in the same patient the results can be catastrophic clotting, either arterial or venous
- In the case of our patient, the trauma to the popliteal artery set off a localized cascade of clotting events made much worse by the other two problems



# Should the Patient Have Had a Pre-Op Clotting Workup?

- She had no history of pathologic clotting
- Most orthopedic surgeons do not get routine clotting studies pre-op
- Had they been obtained in her case they would have been normal
- Some patients with anti-phospholipid antibodies have a slightly prolonged PTT but others do not; our patient did not



# The Disposition

- Based on the clotting studies, the new vascular surgeon thought it prudent not to try to revascularize her lower leg
- She was placed on coumadin, continued on aspirin and over the next year her foot pain gradually improved
- She has never been well enough to play soccer again and gave up her dream of becoming a surgeon because she was in too much pain after standing for a long time





# The Law Suit

- With her career in tatters and in some pain all the time our medical student sued her orthopedic surgeon and the original vascular surgeon who had repaired her popliteal artery three times without stopping to ask whether there was anything wrong with her clotting mechanism
- I was asked by the lawyer for the medical school (both doctors were full-time salaried faculty members) to help her understand the clotting issues



# Creating a Viable Defense

- Our medical student (now plaintiff) had the misfortune of having the perfect storm:
  - A mild inherited clotting disorder which might never have given her trouble but for...
  - A second acquired clotting disorder which is a *forme fruste* of lupus and can result in anything from just an abnormal blood test to a fulminant hypercoagulable state and...
  - A surgeon using a new instrument with which he was unfamiliar



# The Law Suit

- As part of the process of putting on a law suit each side can question under oath (depose) opposing experts to find out what they will say at the trial
- I was deposed and used the perfect storm defense minus the part about the new surgical instrument, because at that point I did not know about it



# The Law Suit Takes a Turn

- Initially, without the knowledge of his attorney, the orthopedic surgeon tried to conceal his relationship with the device manufacturer and his inexperience with the new device
- During the course of the plaintiff's investigation the relationship surfaced; the plaintiff's lawyer would never admit how he found out



# The Turn, continued

- Because of the seeming effort to conceal, the medical school's risk manager and attorneys decided to settle the case out of court out of concern that a jury would not like the surgeon over the concealment
- The settlement was expensive
- The medical student resumed her studies and is now a resident in Pathology where she can sit most of the day



# Was anyone actually negligent?

- Medical and surgical advances come at a cost.
  - Every surgeon does his first case using a new procedure or device at some point
  - There is no ethical mandate to tell the patient about his inexperience
  - Consulting (financial) relationships are widespread in the profession, although some medical schools are trying to ban them



# Duty to inform, continued

- Was the orthopedic surgeon obligated to tell his patient of his relationship with the device manufacturer?
- Was he obligated to tell her he had never used the device before on his own?
- Is he to be held to the same standard he would be if he attempted to publish his results with the new instrument in a reputable medical journal, or give Grand Rounds at EVMS?



# When Good Doctors Make Bad Mistakes

- The screw through the artery can be viewed as a complication rather than negligence
  - No medical intervention is risk-free
- Both the orthopedic surgeon and (more importantly) the vascular surgeon failed to appreciate that the patient's response to the repair of her artery was pathologic....the knee was connected to the rest of her body including her clotting proteins





# Good Doctors, Bad Mistakes, continued

- The second vascular surgeon immediately appreciated the response to the initial vascular repair as pathologic, obtained the appropriate advice and solved the mystery
- The patient was fortunate not to lose her leg but has suffered permanent damage



# Are these isolated cases or can we learn anything?

- What are the teachable moments for all of us?
- Are there generalizations about medical errors that these cases illustrate?
- Can learning about medical errors make us all better physicians?
- Psychologists have been studying errors for decades...



# Types of Medical Errors

- Confirmation Bias
  - The tendency of people to favor information that confirms their beliefs (as in the first case)
  - Can be at the point of gathering, remembering or interpreting information
  - Enables people to use ambiguous evidence to support their belief
  - Can result in polarization of beliefs: a hardening of conclusions in the face of ambiguity



# A Brief History of Confirmation Bias

- Thucydides, in the *History of the Peloponnesian War* wrote, “...it is a habit of mankind...to use sovereign reason to thrust aside what they do not fancy.”
- Dante writes in the *Divine Comedy*, “...opinion—hasty—often can incline to the wrong side, and then affection for one's own opinion binds, confines the mind.”
- Psychology research in the 1960's reformulated the concept, concluding that people create *heuristics* – cognitive shortcuts – to help them interpret complex data, and that those heuristics can lead to false conclusions



# The Availability Heuristic

- The likelihood of an explanation for an event depends on one's prior experiences and familiarities, e.g., mistaking essential tremor for *delerium tremens* in an inner-city setting
- The physician will misattribute a symptom for a specific disease based on the frequency with which he sees that disease
- At one point heuristics were considered a good thing by medical educators, the product of a conditioned mind, a useful shortcut
  - Not so much anymore



# The Fallacy of Logic

- Assuming from first principles (e.g., of physiology) that something that should work will work
- Dr. James Lock, Chief of Pediatric Cardiology at Harvard, writes of inventing new procedures to treat rare congenital heart defects only to see them fail miserably because his reasoning from first principles was based on incomplete knowledge



# Disregard of Uncertainty

- “Don’t just stand there; do something!”
- Physicians feel compelled to act despite inadequate data
- Dr. Jerome Groopman, in *How Doctors Think*, advises on occasion, “Don’t just do something; stand there.”



# New source of error: Medical Synecdoche

- *Pars pro toto*: part of a thing is used for the whole, or.....
- *Totem pro parte*: a thing is used to refer to a part of it
- The knee is used to refer to the entire patient – or.....what happened to the patient who was connected to the knee?





# Additional Source of Error: Medicine By Committee

- The name of the physician on the bracelet no longer conveys the significance it once did
  - The hospitalist usually has no prior acquaintance with the patient and often cedes care to one or more specialists who may or may not converse during the course of the hospital stay
  - Critical decision making is blurred
  - A rich literature about hospitalist error is emerging, thus far without solutions



# Partial Cure for Error: The Do Over

- Much hyped in current culture as being impossible; usually is with surgery
- In fact when a patient is not doing as expected, one approach is to restart the process, go back to the H&P, lab and x-rays and take another look at the data; look at the actual x-rays; don't rely on the report
- In both of these cases, this approach might have resulted in a more effective path to a diagnosis
- Does not solve problem of medicine by committee



# What About Transparency?

- Medical-school based and hospital-based review committees look at bad outcomes
- Errors are openly discussed, at least in theory
- Physicians are allowed to express contrition and devise a plan not to commit the same mistake again
- I know of no data to show whether this exercise reduces variance or improves outcome



# What About the Autopsy?

- My “Allen Street” experience



# What About the Autopsy?

- My “Allen Street” experience
- Historically the autopsy was a powerful teaching tool in uncovering unanticipated pathology – until recently
- The autopsy is a money loser for the hospital and exposes the physician to liability for missing the diagnosis, especially in a medical-legal setting



# Do checklists help?

- Checklists are becoming part of the fabric of surgery
- Work best when ritualized behavior can be standardized – e.g., hip replacement or cataract surgery
- Probably have only a limited role in the care of the seriously ill hospitalized internal medicine patient
- May help in the outpatient care of children and adults in preventing obvious omissions like immunizations and cancer screenings



# Is there a role for the EMR in preventing errors?

- The promise of the EMR was to improve quality of care, reduce variance and control costs
- Thus far none of those promises has been realized
- The EMR as currently rolled out by software vendors can track compliance but with few exceptions does not improve care by suggesting strategies to the physician to improve outcome...although it could
- Most systems do require a physician to sign electronically all lab and x-ray reports before they can be admitted into the EMR, forcing the doctor to deal with the results of the test he may or may not recall ordering



# The Riverside Experience

- Their EMR can compare expected versus observed complication and death rates in PCP practices and score physicians on the O/E ratio of deaths in their practices, when adjusted for severity of illness
- The bottom 10% of PCPs are brought in without fanfare each year for counseling and advice
- Their EMR does not prompt physicians to order the overdue mammogram or act on an abnormal lab test
- The EMR documents but does not suggest or innovate





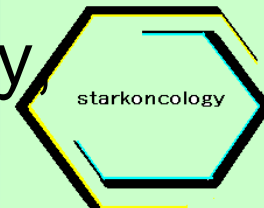
# Lessons for the Future

- What can we take away from these two cases as they exemplify types of medical errors?
- My take on this: when in doubt create a Do Over
- The academic teaching institution may be the best place for a Do Over
- Morning report may be the optimal venue



# What about the “Real World” outside of academe?

- Arguably uncovering error is much more difficult
  - Solo practitioners by definition have no peer group with whom to consult – my experience
    - Cross-covering physicians are typically not helpful
  - Even in group practice time constraints make a Do Over improbable; hospitalizations to unravel complexity have disappeared
  - Continuing education is much more spotty, less focused and directed



# Reducing Error in the Real World

- To a busy practitioner action and reflection are at opposite poles
  - The Groopman admonition – *Don't just Do Something; Stand There* – is unfortunately practiced infrequently in the real world
- Recognition of the possibility of fallibility must be a good start
- Suggestions from the audience....?

