

Twenty-five years of doing (regional) anesthesia.

Have I learned anything?

1. Doing anesthesia is not like flying a plane... it is not even close

It is often said that doing anesthesia is a lot like being a pilot, “Hours of boredom interrupted by moments of sheer terror.” As a pilot and an anesthesiologist, I don’t agree with that description. Over the years, I have found that in the operating room, patient (passenger) problems usually develop slowly giving the anesthesiologist (pilot) ample time to make “on course” corrections without the “sweaty white knuckles.” On the other hand, making an instrument approach at 100 mph, down to a decision height of 200 feet above the ground while looking for something that looks like an airport through a windshield of gray is white-knuckle stuff. Keeping the plane on the final approach course, at the proper air speed, at a 500 feet per minute decent rate, and talking to air traffic control is what is known as “having a lot of balls in the air at one time.” Add to that landing at night, at an unfamiliar airport in the midst of a few mountains and now you are talking shear-terror-stuff.

Here is the crux of this matter. When I do anesthesia, I know that no matter what happens to the patient, I am going to survive. However when I am flying a plane, it is me who is going to crash and burn.

I don’t want to give the impression that I am not concerned about my patient’s safety. However, the fear factor is very different and real when you are flirting with your own destiny as opposed to someone else’s.

In twenty five years, I can recall only one close call with a patient that gave me the white knuckles that I have felt so much more frequently while flying. She was a young healthy woman having an elective gynecologic operation under general anesthesia. I was alone. Had I been with a resident this probably wouldn’t have happened. I can not remember why I extubated her when I did, but it was clearly too early. She developed laryngospasm, which took me by surprise. Before I could give her succinylcholine to break it, her oxygen saturation had fallen to 40, or was it 20! The mind has a way of repressing painful details. I remember her, as if it was yesterday. I remember feeling faint and sick to my stomach (a vaso-vagal-depressor-reaction) as it flashed through my mind that my patient was dying. In retrospect (and this is a story for another lecture) fainting and maybe even dying myself was a possible way out of this horrible situation for me. Fortunately for me and for her, I didn’t faint or die and I was ultimately able to ventilate her and she awakened with negative pressure pulmonary edema that resolved after an overnight admission for what was intended to be an outpatient operation. She was fine, but I was not. I have never forgotten her. Thankfully, I have had more of these “near hits” while flying (alone) than while doing anesthesia. I prefer to call them “near hits,” because a miss is a miss and what is really avoided by nearly missing is a hit.

There are two saying about flying that *are* true for anesthesia as well.

“Aviation is not inherently dangerous, but unlike the land and the sea, it is unforgiving of any incapacity, carelessness, or neglect.”

For me, these are the analogies between anesthesia and flying that are truest. Before flying or doing anesthesia I assess the risks associated with leaving the ground. Good preflight planning and knowing my limitations keep me from wishing I were on the ground once I am airborne.

2. Don't talk patients into having regional anesthesia

I did anesthesia training at the University of Vermont from 1978-1981. I am sure that it is hard for most in this audience to imagine a teaching hospital without a post-anesthesia care unit, but there was none at the Medical Center Hospital during the first two years of my training. The positive side of this situation was that the department's philosophy and policy -- “perform regional anesthesia unless there is a contraindication” and not the converse. As residents, we were fortunate to be at an institution where the art and craft of nerve blocks, spinals, and epidural anesthesia were preferred and taught. We learned general anesthesia too during those intrathoracic, head and neck and intracranial operations. Our indoctrination as residents were to badger patients who were reluctant to have a spinal and when all else failed to use the scare tactic that death was more likely with general anesthesia than with regional. There was a modicum of truth to that, if you consider that the patient is going to recover on the ward and not a modern pacu. Basically our patients were “on their own” once they left the operating room. We of course did our best to be certain that the patient would “make it on their own.” And I still believe that a patient recovering from a spinal, nerve block, or epidural, has fewer recovery risks (and less pain) than patients recovering from general anesthesia including the aftereffects of larger doses of narcotics, muscle relaxants and reversal agents.

However, there is a limit to this philosophy and once I was reasonably sure that I wouldn't be canned from the program, I stopped badgering patients into having regional anesthesia. I remember an elderly woman who really didn't want to have the spinal that I was insisting that she have. After all, I was indoctrinated (brainwashed) in the belief that a spinal is better than general. I asked her why she was reluctant to have a spinal. I didn't get the usual, “I knew someone how had a spinal and they are paralyzed as a result of it.” Her concern was that she knew someone who had a spinal and they had severe back pain afterwards, and she was convinced that she would have a backache if she too had a spinal. She finally relented and I was pleased with my arm bending tactics.

It was a perfect spinal. Only one stick, good level of anesthesia, no discomfort intraoperatively. What could be better? I thought certainly that I would get accolade on postop rounds the next day. It didn't turn out as I fantasized. Guess what she complained of? A backache. Who'd-a-thunk-it? This was a very nice lady, who was convinced that she would have a backache if she had a spinal. And she was correct. It was a self-fulfilling prophecy. She taught me a lesson that I have never forgotten.

Since this encounter, I have never “talked another patient into a regional anesthetic” who didn’t want one from the get-go. For me the patient has to willingly accept a regional anesthetic when offered to them. Occasionally, there are good reasons for “talking a patient” into a regional anesthetic. For example, it makes good sense to propose a regional anesthetic for the patient with severe asthma. Conversely, it makes no sense to instrument the tracheal-bronchial tree of an asthmatic when we don’t have to. However there are few cogent arguments today for disagreeing with a patient’s choice of anesthesia when there are no overriding issues. Having said that, I will be first to admit that as anesthesiologists our major morbidity and mortality stems from failure to control the airway during regional anesthesia. This is part of the reason that regional anesthesia has become so popular in obstetrical anesthesia.

3. Sedate patients who are having regional anesthesia

Another lesson that was not wasted on me was the case of a fifteen-year-old girl with appendicitis. As I said, it was our policy to do regional anesthesia whenever possible. This girl, although only fifteen was mature actually a good patient. At least during the operation. Back in those days, patients were not discharged immediately after an operation and the drug of choice for a spinal anesthetic in a teaching hospital was tetracaine. Like the patient in rule number two, the anesthetic was flawless. A single stick, good level, solid anesthesia, no nausea or vomiting. The operation didn’t last that long and I carried on a conversation with her.

Again, I expected accolades the next morning for a WCRA (well conducted regional anesthetic). I was wrong again. I asked, “What do you think of the spinal anesthetic that you had yesterday?” “It was awful and I will never have one again,” she replied. I was shocked. I was devastated. How could she say that? It was perfect from my perspective.

You will recall that I said we had no PACU back then. So, this girl went back to the ward and I hadn’t sedated her all that much because we always worried that, on the ward, patients really were on their own and I didn’t want anything to happen because of over-sedation.

She agreed with me that the spinal was perfect in the operating room. Her complaint was afterwards. She complained that she didn’t like the sensation (or I should say the absence of sensation) and the paralysis. She complained that the spinal took a long time to wear off and she hated the feeling of being numb and not being able to move. We should always strive to learn from our patients and again this patient taught me another lesson. I feel badly that it was something that I did that turned this patient against spinal anesthesia.

Since then I try to make the spinal experience a pleasant one. The take home lesson for me was to sedate patients intraoperatively and to give enough sedation so that it will carry over into the PACU phase. I have had two spinal anesthetics myself. But, I am an anesthesiologist and I know approximately how long the spinal is going to last and I

don't worry that it is not going to wear off. You have to have had a spinal anesthetic to appreciate how dense the sensory and motor block is. It is intensely dense! I do not rely on the PACU personnel to continue the sedation after I leave. Their goal is to discharge the patient and sedation is not viewed as hastening that process.

Most patients are not interested in being wide-awake during their operation unless they are having a knee arthroscopy and they want to watch the operation on a monitor, or a cesarean section in order to witness the birth. Sedation makes the time go by faster and even an operation as short as an hour seems long to a patient who is lying on a hard operating table. Once the arthroscopy is done or the mother has seen her new baby, I routinely sedate the patient even if the patient appears in control and not stressed intraoperatively (like my fifteen-year-old patient appeared). Sedation makes it seem like the spinal didn't last that long and lessens the perception of the denseness of the sensory and motor block. Hopefully this produces a feeling in the patient that they would have another spinal if they should need it in the future.

4. Learn from the mistakes of others

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I talked about the analogy between doing anesthesia and flying earlier. One of the things that pilots do is try to learn from the mistakes of other pilots and in some cases, mistakes of pilots who may not have survived. The National Transportation Safety Board (NTSB) evaluates all plane crashes and publishes their findings as to the cause (pilot error, equipment failure, etc.). I fly a Mooney and I belong to the Mooney Aircraft Pilots Association (Beechcraft and other aircraft types have similar associations). The Mooney Aircraft Pilots Association (MAPA) publishes a monthly periodical called the MAPA Log. In it there are MAPA Safety Foundation article of NTSB reports about Mooney aircraft crashes. The Aircraft Owners and Pilots Association (AOPA) publishes a monthly magazine that has an "I Learned From That" or a "Never Again" article, where pilots report their near death experiences. I enjoy reading those articles and I believe some may have actually kept me alive. It is preferable to learn without actually being involved in a crash.

Anesthesia has similar ways to learn without actually dragging a patient through damaging events. There are simulators (which pilots also use), case reports, and the Anesthesia Patient Safety Foundation (APSF) Newsletter. However, the ASA Closed Claims analyses are, as far as I am concerned, the most useful.

The ASA Closed Claims can be accessed at: <http://www.asaclosedclaims.org/>

Because I am focusing primarily on regional anesthesia, the ASA Closed Claims references of greatest interest in this regard appear in the bibliography.¹⁻¹² Here is

information that I have culled from these valuable works. Please go to the ASA copyrighted links for complete details including tables and figures.

High-Severity Injuries Associated with Regional Anesthesia in the 1990s.¹³
(http://depts.washington.edu/asaccp/ASA/Newsletters/asa65_6_6_8.shtml)

Summary of results:

Death

- 4,723 closed malpractice claims
- 3,180 (67%) general anesthesia
- 1,133 (24%) regional anesthesia
- 30 deaths
 - 30% (n = 9) owing to cardiac arrest during spinal or epidural anesthesia
 - 1970-1980 = 61%; 1980-1990 = 40% cardiac arrest and death
 - 10% (n = 3) due to intravascular injection
 - median payment for death \$310,000

Permanent Disabling Injuries

- mostly neuraxial narcotic or neurolytic block
- cause not clear but presumed needle trauma
- hematoma usually associated with heparin
- 21% due to pain management (mostly chronic pain)

Conclusions

- regional anesthesia claims are more likely to be of a lower severity than those associated with general anesthesia
- cardiac arrest/circulatory collapse associated with neuraxial block continues to be the leading cause of regional anesthesia-related death
- comparative safety of regional versus general anesthesia cannot be determined (no denominators)
- death more common with general anesthesia, while permanent-disabling and non-disabling temporary injuries are more prevalent with regional anesthesia

Let's turn our attention to the obstetric patient, as this is a group of patients very likely to have regional anesthesia. The last comprehensive analysis of obstetric related cases was published in 1996.

Obstetric Versus Non-obstetric Claims¹⁴

(http://www.asahq.org/Newsletters/1999/06_99/Obstetric_0699.html)

Summary of results:

Generally

- 12% (434/3,533) for c-section (71%) or vaginal delivery (29%)
- 67% (290) with regional anesthesia
- 47% for headache, pain during anesthesia, back pain and emotional distress
 - these are more commonly associated with regional anesthesia
- almost all claims for pain during anesthesia are associated with cesarean delivery
 - inadequate analgesia for labor and vaginal delivery is seldom a liability risk
 - pain during cesarean section is a cause for concern

Events leading to injury

- respiratory events most common
 - greatest incidence with general anesthesia
- the single most common damaging event in the obstetric closed claims files was convulsion related to local anesthetic toxicity associated with epidural anesthesia
 - the number of claims involving convulsions has decreased substantially since 1984
 - using effective test doses, fractionating local anesthetic injections, and not using 0.75 percent bupivacaine has likely reduced the risk of this injury.
- nerve damage was the third most common maternal injury claim
 - appears to be a result of direct trauma to neural tissue
 - a prominent feature was severe pain or paresthesia during needle or catheter placement or during local anesthetic injection
 - other mechanisms of injury, such as apparent neurotoxicity and ischemic causes (epidural abscess, hypotension or vascular insufficiency) less common
 - no cases of epidural hematoma identified

5. Make certain the patient has adequate regional anesthesia.

Although this relates more to obstetric patients, the following lessons learned from the obstetric v. non-obstetrics closed claims analysis¹⁴ are true also for all patients having regional anesthesia.

“Liability risk in obstetric anesthesia differs considerably from that in non-obstetric practice. Complications involving the respiratory system account for the largest proportion of damaging events in both groups and problems with difficult intubation and pulmonary aspiration are disproportionately represented in the obstetric files. These findings corroborate most anesthesiologists' belief that the pregnant patient's airway demands additional attention and care. *As for regional anesthesia-related claims, local anesthetic toxicity remains a concern, although the number of such claims appears to be declining.* Nerve damage also constitutes a relatively large percentage of claims, although, as with newborn brain injury cases, the relation to anesthesia care is often in doubt.

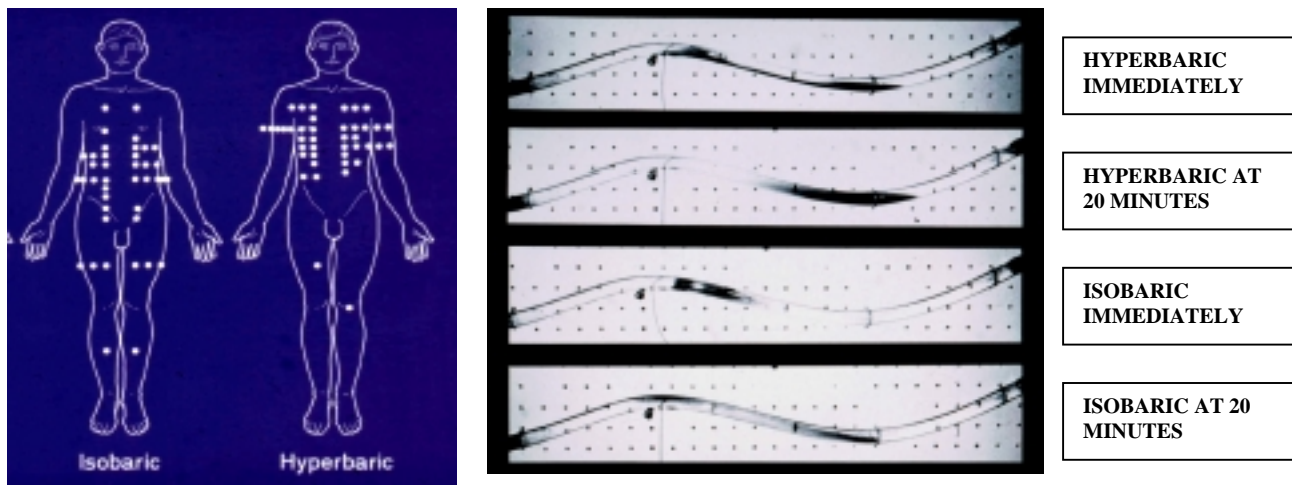
The most surprising difference between obstetric and nonobstetric claims is the large proportion of claims for relatively minor injuries in the obstetric files. While reducing major adverse anesthetic outcomes in obstetrics is important, *attention must be paid to limiting liability risk associated with less severe outcomes like headache, pain during anesthesia and emotional distress.* To some extent, the large proportion of relatively minor injuries in the obstetric files may be due to a greater incidence of such problems in these patients. However, detailed review of these files suggests that *in many cases, patients were unhappy with the care provided and felt mistreated.* Clearly, factors other than major injury are important in motivating a patient to bring a claim.

Therefore, anesthesiologists should attempt to conduct themselves in a manner such that patients will not be motivated to bring a suit for an unexpected outcome. *Measures should include establishing and maintaining good patient rapport.* Anesthesiologists should become involved in the prenatal education process. A careful preanesthetic evaluation is very important and should occur as early in labor as possible. *Special care should be taken to provide patients with realistic expectations of common minor and potential major risks associated with anesthetic procedures.* This discussion should be clearly documented in the medical record.”¹⁴

6. I can not control the level of spinal anesthesia.

Believing it might be important to do so, I tried for fifteen years to control the level of spinal anesthesia. I can state categorically that I have failed... miserably. The interesting thing is this. For the past ten years I have not tried to control the level of anesthesia and at least in my mind, I have since then been doing better spinal anesthesia. This is not to imply that the goal of precise control of spinal anesthesia is not important and should not be pursued. However, as I complete twenty-five years of anesthesia practice, I realize that I will probably not have the time to achieve this lofty goal. It is a good project for a so-called "Young Turk."

Since what I write here is more of a memoir than a peer reviewed manuscript, allow me to put down what has worked for me. Here are two images that illustrate a) the actual distribution of tetracaine in patients and b) of bupivacaine in a spinal canal model. In all cases the patient or the model were injected in lateral decubitus position and turned to the supine horizontal position.



There are a number of things to note:

- Regardless of the baricity, the variability in the level of spinal anesthesia in the patients is vast.
- The information gained from the model mirrors the data obtained from the patients.
- The "tightest control of the level of spinal anesthesia" occurs with hyperbaric solutions. Unfortunately the final height is in the mid-to-high thoracic region and is higher than desirable for most patients.

- d) There is more variability with isobaric solutions. However, in spite of its greater variability, isobaric solutions remain in most cases in the low thoracic and lumbar regions. This provides more intense anesthesia in the lumbar and sacral distribution and decreases [on average] the number of patients with “too high” blocks.
- Hyperbaric solutions provide the best anesthesia for intra-abdominal operations.
 - Isobaric solutions provide the best anesthesia for lower extremity operations.

Once injected into the subarachnoid space, many factors affect the spread of the spinal anesthetic drugs and as shown above, individual variability is wide. Over the years, many of these factors have been studied and quantified,¹⁵ the clinician and certainly residents, want an answer to the question, “How much of what drug do I inject in this patient for this operation?” In spite of our knowledge of how spinal anesthesia may be varied by such things as dosage, baricity, posture, site of lumbar puncture, patient age and weight, etc., a practical approach serve me the best. I want to anesthetize 100% of patients. To do this, many patients receive a greater dose than is strictly required. I am on guard for this, namely high block and/or hypotension. Conversely, I sometimes face an inadequate block. It is important to have a strategy for both worked out in advance, i.e., be prepared to intubate (extremely unlikely and I have not done this in twenty years), treat hypotension or convert to general anesthesia if the block is inadequate.

A recent erudite article on the anatomy and distribution of bupivacaine in the subarachnoid space¹⁶ makes me believe that goal of precisely controlling the level of spinal anesthesia is not yet within reach and probably will not be achieved in my lifetime.

So what do I do, what do I use? I use:

- 15 mg hyperbaric bupivacaine (tetracaine is a lousy drug) for longer intra-abdominal operations as these patients are unlikely to be discharged that day.
- 10 – 15 mg of isobaric bupivacaine for longer lower extremity (including hip surgery) for patients who are not going to be discharged that day. Bupivacaine will definitely delay the discharge of a same-day patient.
- Shorter operations in same-day patients pose a problem because of the transient radicular irritation that lidocaine can cause in as many as 30% of these patients. I have been feeling my way with dosing 3% chloroprocaine.¹⁷⁻²² Because the pH of 3% chloroprocaine is 3-4, I adjust it by added 0.25-0.33 ml of 8.4% NaHCO₃ per 10 ml of chloroprocaine. 3% chloroprocaine is slightly hyperbaric, so it is useful for both intra-abdominal and lower extremity operations. In a

few years I will be able to tell you how much to inject. For the time being, I use 40-100 mg depending on the estimated duration of the operation. More lasts longer than less.

7. I don't torture pregnant women?

As I travel through my career in anesthesia, something that struck me a long time ago is that we often do not question why we do things the way that we do. I believe it is a good thing to sit back and take stock every now and again. This happened to me recently as I was walking down the hall the other night when I was on call for obstetrical regional anesthesia. It occurred to me, as I heard a woman who did not have an epidural and who was screaming in pain during a contraction, that we would never tolerate someone screaming like that in the PACU, after surgery. Why does the JCAHO fifth vital sign (pain score) not apply to the laboring patient? I guess this is steeped in the tradition and belief, that the pain of labor is "normal" and something to be tolerated. Certainly, pregnant women who want to have that kind of pain, have their right to do so. If it was me, and fortunately, as a man, I will never have the so-called pleasure of delivering a child, I would opt for analgesia, at the first opportunity.

Years ago and before epidural analgesia became so popular, it was customary to treat the pain of labor with meperidine and scopolamine. However, because of the amnesia associated with them, those drugs have today been replaced by the partial agonists like butorphanol or nalbuphine. But I still hear the screaming!

Furthermore, when we perform lumbar epidural analgesia in the labor room, the patients often undergoes the procedure "cold turkey" and without the sedation/analgesia that we would use during the performance of an epidural, say for a hysterectomy in the operating room. I guess we do that so that we don't cause respiratory depression in the infant.

Nonetheless, there are some patients who are so frightened of an epidural (but who want one) or spinal that it is actually cruel to try to do the procedure without sedation/analgesia. I have stopped doing this to these patients. I believe it is a misconception that we cannot give a pregnant woman a small amount of sedative/analgesic medication to accomplish a painful procedure. In the operating room a modicum of propofol goes a long way to accomplishing a spinal anesthetic in a patient who is otherwise squirming and trying to move away from the spinal needle. The propofol is long redistributed from the infant by the time it is born. In the labor room I have been using 50-75 ug of fentanyl for the fearful patient. And why not? After all we usually give them 20 ug of fentanyl per hour for hours on end via the labor epidural infusion.

8. It is better to be lucky than good.

Let me wind up with my corollary to the aphorism, "It is better to be lucky than good." The corollary is, "It is best to be lucky and good."

A professional golfer once replied to a sportscaster who, said to him, "That was a lucky shot you had on the last hole," with this riposte, "Yes it was, and the more I practice the

luckier I get.” I believe the way that we become “good” at what we do in anesthesia, is to read and to “practice.”

Unfortunately, I don’t know how to make anesthesiologists luckier, but like the “lucky golfer,” reading and practicing are good substitutes. I do know that I have often said to myself, “Don, you were lucky on that one.”

9. Summing up... **In twenty-five years of doing (regional) anesthesia. Have I learned anything?** I think I have learned this:

“It is better to be on the ground wishing you were flying,
than flying and wishing you were on the ground.”

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