

Preface

“Even within a specialty such as general surgery different physicians seldom provide equivalent services. Although most general surgeons receive comparable training leading to Board-certification, the services they provide in practice may be highly variable.”

Karen B. Stitzenberg, MD MPH, George F. Sheldon, MD FACS *J Am Coll Surg* 2005

“Nowadays, becoming the consummate general surgeon is difficult – some would say impossible – with the expanding range of surgical diseases, disciplines, and the development of new therapies and techniques.”

Said C. Azoury, MD *Bull Am Coll Surg* 2014

Writing about patient safety, like performing intricate surgery, has moral consequences. Readers and patients must be able to trust the practitioner to do the right thing. The practice of surgery has always carried with it the freighted obligation to do only that with which the surgeon has extensive experience. True informed consent requires that the individual surgeon’s actual expertise – as contrasted with the profession’s overall claim of mastery – be shared with the patient. In today’s cluttered practice of general surgery, the obligation to be transparent about personal training and

experience stands out as the biggest challenge for practicing surgeons. Thus, the topics I have chosen to discuss regarding surgeon capability such as surgical innovation and learning curves hinge on the deeper meaning of our moral obligation as surgeons to communicate honestly with our patients.

My primary goal in writing this book is to reveal what has not been adequately discussed with the public: that there are new risks patients may be exposed to when seeking a surgical operation. I will describe how this occurred and why surgical expertise continues to be available but frequently in a different distribution than in the past. Therefore, the dilemma for you, a potential surgical patient, is how to determine if the surgeon to whom you have been referred is well-trained to do the particular operation you need.

From the outset of the laparoscopic revolution (a laparoscope is a lighted telescope pushed through a 'sleeve' into the belly cavity with the surgical field displayed on an overhead TV screen) surgical educators have known that the addition of large numbers of minimally invasive (laparoscopic) operations to the plethora of traditional open procedures already in use would pose almost insurmountable challenges for our profession. I will shed light into the opaque corners of modern general surgical practice and will chronicle the impact of the laparoscopic innovations of the last three decades. Foremost, my concern is that the relatively swift shift to less invasive laparoscopic 'keyhole' operations from scalpel-based procedures has thrown the daily practice of surgery, our education methods, and patient safety into a state of uncertainty.

It was said some years ago regarding pressing issues of 21st century surgical practice, "...is the issue of mounting pressure for physicians to demonstrate their

competence and ability to deliver high-quality patient care.” (1) Referring to the value of documenting that surgeons have good outcomes (low rates of wound infections, pneumonia, deep vein clotting, etc) the author added, “The question is, are there other methods which we can use to evaluate the competence of the surgeon?” (2) There are and I will examine why this is important and describe methods you may use to check on a surgeon’s track record.

But, first let’s look at the big picture.

In America, you have available to you in most locations the most sophisticated surgical care in the world – if you know where to look for it. That’s the key issue. Surgical talent abounds in the U.S. But, not every surgeon possesses the same capabilities. Before the laparoscopic revolution arrived in 1990, general surgeons were more alike in skills and knowledge than today. Now, you must discuss what operations your surgeon does frequently. So remember that almost nothing is the same in the world of twenty-first century surgery as compared to twenty or thirty years ago.

In the last two plus decades ragged pockets of incomplete training have found their way into the otherwise tightly knit fabric of the U.S. surgical community. A quick statistic speaks volumes to the challenges facing twenty-first century surgical educators. There are one hundred and twenty one operations considered ‘essential’ to the field of general surgery. Our current graduates will *not* have performed or observed (scrubbed in the operating room) on even one case of fifty per cent of those basic operations. In other words, *newly minted general surgeons will only have been exposed to half of their specialty*. And they will have done very few of many of the other essential operations on the list. (3) Keep these statistics in mind when I challenge the notion that our general

surgery graduates are capable of starting out in practice as competent practitioners in all aspects of general surgery.

Prior to 1990, general surgeons provided care for a large variety of diseases. The scope of a general surgeon's practice formerly included all aspects of the care of traumatic injuries, cancer care, and the management of infectious and inflammatory diseases. Major diseases involved the skin, thyroid gland, breast (endocrine surgery), lungs and bronchi (thoracic surgery), all types of blood vessels (vascular surgery) and all diseases of organs in the abdomen (liver, spleen, gastrointestinal tract). In the 1970s and 1980s specific specialty areas broke away from the main body of general surgery. Vascular surgery is a prominent example of a collection of operations – most commonly on abdominal aorta aneurysms ('ballooning' and weakening of body's biggest artery), blocked carotid arteries in the neck (clogged with fatty deposits) and procedures to bypass narrowing (blockages) in the lower extremity – that require specific technical skills.

Then, with unusual reluctance at the outset of the decade of the 1990s, general surgeons joined their gynecologic and urologic colleagues and began to learn how to perform less invasive but nonetheless complex laparoscopic operations. A decade and a half later, a prescription for failure crept into the daily workings of surgical education in the form of work hour restrictions for trainees. These two cataclysmic changes – the imperative to learn a large number of new complex laparoscopic operations during less training time – arrived with the laparoscopic revolution. These changes were not only disruptive to our practices, the two diametrically opposed forces also completely revolutionized how we train and educate young surgeons.

These forces explain why we are not as easily able to train general surgeons to do the wide scope of operations that you, the public, expects of them. Although some surgeons will disagree with my thesis, the data is compelling. It all began in the 1990s when our professional obligations multiplied as the technical challenges imposed by laparoscopy confronted general surgeons with a harsh reality: our specialty abruptly underwent a mitosis-like doubling: traditional open operations became retooled in order to be performed with tiny incisions and a laparoscope. The less invasive operations forced us to accept the indisputable fact that general surgery had divided in two – just as one cell splits into two cells in the process of mitosis. It was when a long list of laparoscopic operations quite suddenly was added to the bread and butter caseload of daily general surgery practice. Specialty surgery – if not already utilizing less traumatic procedures (arthroscopy, pelviscopy, cystoscopy, etc.) – soon followed suit.

For example, in 1988, 0% of gallbladder removals were done laparoscopically. By 1992 over 80% of cholecystectomies were performed with the innovative less invasive operation. Now, that is the consequence of a revolution. *Laparoscopic cholecystectomy* (minimally invasive removal of the gallbladder) didn't creep up on surgeons; it exploded onto the general surgery scene. Other organs were assaulted with the laparoscope as the 1990s plunged us into a world of chaos.

How we got to this juncture in the ever-evolving history of modern surgery is the subject of this book. And, as you will discover the chaotic early history of laparoscopic general surgery is as fascinating as it is frightening. Most of the innovations we'll discuss, including those in use currently, are *transitional* forms of technology. We don't know what will confront us next. It may involve robots or 'no incision' surgery; operations

will no doubt continue to be miniaturized. Thus, the story of minimally invasive surgery is far from complete.

Through my pursuit of the history of laparoscopic general surgery, as well as the almost forgotten story of earlier innovations by gynecologists and urologists, I am seeking to tease out the historical threads of surgical competence. These threads have lead to the formation of the current strong cable of overall general surgery capability in the US and around the world specifically using less invasive operative techniques. Yet, at the outset of the laparoscopic revolution, in a 1995 book on complications of laparoscopic operations, the internationally recognized surgeon, Doctor Hiram C. Polk, Jr. stated, “The initial excitement among surgeons regarding the proliferation of various forms of less invasive access is giving way to a more reasoned and organized analysis of the potential pitfalls and perils of such approaches.” (4) Without a doubt, not all was smooth sailing at first.

Thus, my aim is to imagine what sorts of insights into the constantly shifting approaches to surgical disease a modern patient might need to assure one’s personal safety. In order to do so I have reviewed countless scientific studies on the evolution of minimally invasive general surgery. The studies of how laparoscopy evolved, what problems were encountered, and how they were solved involves more detail than can be addressed in this book. However, I will attempt to document as many points of contention as possible in support of my own convictions about the implications of the laparoscopic revolution.

It would be impossible to give credit to all of the historic innovators that figure prominently in the expansive story of laparoscopic surgery. To be certain, this is a story

with complex characters, a twisted plotline, complications and resolutions and a denouement you must appreciate to be an informed patient. I have ferreted out those scenes and sequences, fragments of tales and entire stories that have interested me in doing this project. In particular, I have paid special attention to the messages the historical record offers that seem to be most important in understanding where you may find your surgeon's capability along the continuum of surgical expertise today. That is, it is my contention that you must inquire about the practical experience of any given surgeon you may encounter.

Mitosis.

One cell divides into two cells. Open surgery now joined by laparoscopic (minimally invasive) operations – surgical skills and knowledge mitosis.

The consequence of this immense tangle of surgical innovation and the information explosion that ensued is that no single general surgeon can perform all of these operations in a capable manner now designated as part of our specialty. The political, cultural, psychological and sociological issues will be addressed as the backdrop to my primary discussion of the issue of surgeon capability (studies quoted often use the term *competence* which I deem equivalent to *capability*).

I will develop five themes which when seen in combination create the challenging environment in which modern surgical care is practiced. The *central theme* as articulated above is that the multiplication of new operations – most notably those performed using minimally invasive techniques and ever-changing and increasing complexity of surgical technology – when added to the existing traditional body of 'open'

general surgery procedures precludes practitioner capability in all domains. No one can do it all.

A *second theme* involves the reality that the new surgical education paradigm involves creating a 'pre-trained novice' (a surgical resident learns basic skills *before* going to the operating room) through skills lab learning on models. Nonetheless, some surgical educators remain committed to the notion that competence is strongly anchored to memorizing minutiae. Newly discovered genetic, molecular biological and other facts rarely have *immediate* clinical application and can and should be retrieved on a digital device in seconds – behavior we witness daily with our residents and medical students. While memorizing esoteric scientific information to some degree translates into becoming a competent surgeon, being *capable of retrieving information* and applying it to clinical cases must become the new learning paradigm. We must also remember the disturbing fact that the *human factors* scientific principle of relying on memory – an enduring, unshakable part of all medical education – is a major reason for the creation of medical errors.

A *third theme* involves the unfortunate, but politically motivated idea that fatigue is the new enemy and a prime cause of surgical errors – despite the absence of studies to support this notion. There is no doubt about the adverse effect of fatigue on all sorts of human performance, including technical skills. Data abounds on the subject. Detailed scientific literature on the impact of fatigue and sleep deprivation on performance remains unassailable. Fatigue can lead to mistakes. But, what the public has not been made aware of is the need for multiple 'hand-offs' or patient information transfers that appear to be more dangerous than sleep deprivation itself. A 'hand-off' involves an

informed doctor passing on information to a rested physician coming on duty; just as with the old telephone game where the message gets distorted, patient information transfers have proven to be dangerous as vital facts are lost or changed. The real issue (supported by a new study of surgical resident work hours) regarding patient safety remains buried beneath reams of sleep deprivation laboratory data.

The profession of surgery while greatly improved in terms of how surgeons interact with the public has not developed a zero tolerance for the disruptive features of the surgical personality. Thus, my *fourth theme* is that narcissist surgeons who continue to coerce patients, intimidate nurses from acting independently, as well as discourage medical students from entering our profession by virtue of their behavior should be severely sanctioned. As a consequence of these players, too many surgical residencies are marred by an inexcusable and allowable 'toxicity'.

Finally, my *fifth theme* concerns the urgent need to transform the informed consent process to reflect the new reality of uneven surgeon capability now in evidence. The urgent demand for true transparency (informed decision-making) in surgeon-patient communication, including surgeons *revealing their personal training and operative experience with a particular operation*, reflects the public's growing awareness of the real magnitude of surgical errors. That individual general surgeons possess significantly different surgical skills sets is the new challenge facing patients today. We, as practitioners, must accept that our patients need to know what our true experience is with the operation that particular patient needs. As a patient, you must recognize that *this idea is transformational* and will be resisted by some surgeons in practice. Not that we haven't always performed a variable collection of common operations using

individualized methods – a different kind of suture here, a drained tweaked daily there.

In fact, surgeons routinely perform specific operative procedures in their own way following basic steps and guidelines.

The laparoscopic revolution has muddled the dialogue regarding the benefits and risks for our patients. Scars have shortened to postage stamp length. In this regard, you will also learn how the idea of ‘natural orifices’ surgery – operating through the mouth, anus, vagina, etc. without a scar – crept into the surgical imagination. Paradoxically, this state of affairs stands in absurd contrast to the decade of the 1980s, a perilous period in modern surgical history for general surgeons. Ignoring the unstoppable trend toward less invasive operations driven by gynecologists and urologists, general surgeons risked becoming extinct. As surgeons plunged into heroic cancer and other major incision-based operations, leaving a swath of pain and disfigurement in their wake, creative radiologists and gastroenterologists quietly stole our bread and butter. Notably in this regard, the gallbladder and its truckload of stones very nearly escaped our hands. With little fanfare, gallstones fell into the waiting arms of non-surgeons plying them with medical treatments such as shock waves to ‘smash and pass’ stone pieces, as well as the use of bile salt pills to dissolve them. In the middling years of the 1980s ‘non-surgeon’ interventions exploded in numbers and our aggressive incisions and bloody operations seemed increasingly outdated. And the addition of less invasive operations threw surgical education into a mess.

Here’s a concrete example of the training challenges surgical educators face today: although today laparoscopic gallbladder removal is one of the most common general surgery operations performed in practice, according to some national leaders in

surgical education, 30% of graduating surgical trainees are not capable of performing this basic operation safely. (5) In the same survey of recent surgical graduates who were evaluated by the Program Directors of advanced surgical fellowship training programs, it was noted that 66% of recent graduates were deemed unable to operate for thirty minutes on their own, unsupervised, while performing a major case. Over fifty per cent couldn't do basic laparoscopic suturing and 25% of recently trained surgeons in that study were unable to identify the signs and symptoms of certain post-operative complications. These surgical residents were the products of certified five to seven year surgical training programs in the US. Their Program Directors had signed them off as prepared for practice.

Grim statistics?

Not if you know the rest of the story. Placed into perspective, these statistics reflect the new reality for general surgery residents training under work hour restrictions with an ever increasing number of operations to learn. It is the sobering reality faced by millions of patients undergoing surgery every year in the US. The unresolved question for potential surgical patients is how to deal with what are, in effect, partially trained surgeons.

Above all, this book is not a screed against surgeons. Rather it is an attempt to redefine the meaning of surgical competence for patients as well as for surgeons. In a very real sense, surgical patients must be more cautious and better informed than ever when choosing a surgeon. I will use the example of how laparoscopic gallbladder surgery was introduced into practice as a cautionary tale for all of us. Five years after the first laparoscopic gallbladder removal in the US, Doctor Polk, quoted above, added

in his *Forward*, “The progress of surgery has been marked by a sequence of forward charges, followed by plateau periods during which surgeons have assimilated and reassessed the real value of the surgical advance...Such intellectual and technical plateaus – whose physical and temporal bounds are set only by the limits of our imagination as scientists and clinicians – provide the staging areas from which the future forward advances will be launched.” (6)

Now, twenty years later we are indeed in need of a ‘plateau’ period to reassess the current forward advances involving less invasive procedures such as robotic surgery and ‘no incision’ NOTES operations. Just as important in this pause for professional self-reflection is the imperative to acknowledge and identify the redistribution of surgical talent in the US, as well as define the variability of individual surgeon capability. Competent surgeons abound. But, the one you meet may or may not have the credentials necessary to perform your particular operation safely.

Our core of American general surgeons represents to my mind the hardest working members of the medical profession. They are skilled and competent. However, some are frustrated and burned out. Remarkably, ‘stress in surgeons’ was identified as a real issue at the *beginning* of the laparoscopic revolution in 1990! (7) And it’s more prevalent today. (8) Therefore, I’ll provide you with information you’ll need on this and other concerns in order to understand the current status of general surgery.

To repeat: the new reality is that many of our freshly minted general surgeons are not ready for independent practice. And surveys show that the residents themselves are acutely aware of their deficiencies. (9) This is why 80% of graduating surgical

residents pursue their training further in a variety of fellowships typically lasting one or two years.

The chaotic introduction of laparoscopic surgery into general surgical practice in the 1990s is, in and of itself, a fascinating tale. Referring to this phenomenon one educator stated, “The latter was introduced in an inappropriate manner, which has led to the evolution of teaching of technical skills away from the apprenticeship –based activity toward more formal skill-based training programmes.” (10) Additionally, describing the miscues and successes of the laparoscopic revolution is the best way to explain why, despite the triumph of less traumatic operations, the public remains at risk in the hands of some practicing surgeons today. I’ll spell out in detail what to expect if you must deal with ‘surgeons without scalpels’.

It isn’t a matter of bad surgeons having poor skills. Rather, the issue revolves around some really good surgeons having inadequate training and too little experience with many of the complex new operations making up the technical and knowledge overload challenging today’s general surgeons. It is why graduates often do surgical fellowships for one or two or three additional years. When they enter surgical practice after fellowship training they do so with remarkable technical talent. Additional training in the form of ‘transition to practice’ as established in the form of guidelines by the American College of Surgeons, as well as by some independent residency programs, also assures the public of finding a capable general surgeon. Thus, a uniform and broadly accepted definition of surgical practitioner competence is no longer available.

In their 2009 book, *The Coming Shortage of Surgeons* Doctors Williams, Satiani and Ellison remarked on the experimental method of a less invasive type of surgery

known as NOTES – *natural orifice transluminal endoscopic surgery*. It refers to operating through the mouth, vagina, anus, or other ‘natural’ body openings and thus leaves no scars. They ask, “Will there be enough general surgeons to perform these procedures and lead the way to further innovation directed towards making procedures less invasive, painless, and safe?” (11) How far the dilemma has progressed in the few years since the book was published. As I indicated, our graduating trainees feel inadequate about their *basic* surgical skills and in no way in the immediate future can they expect to master robotic operative skills let alone the exquisite operative challenges of NOTES.

How did this happen? Is less invasive laparoscopic surgery always the best way to go? And how can you find a surgeon with the skills your particular operation requires?

The remarkable thing about the laparoscopic revolution is that it contains all of the practitioner errors, miscues, prejudices, invective, ridicule, self-importance and bitterness that have characterized every major advance in medicine. For years general surgeons ridiculed gynecologists for their ‘Mickey Mouse’ keyhole operations performed deep in the half-hidden recesses of the pelvis. Then, in the decade of the 1990s surgeons acknowledged, red-faced and embarrassed, the need to learn that very challenging minimally invasive technologic innovation themselves. Our patients wanted less pain and a faster recovery. But, sadly for the public the initial results of laparoscopic gallbladder removal were frightening.

At first, little was said publically about surgeon error at the beginning of the laparoscopic revolution. The good news is that today surgeons overall have remarkable

skill with the less traumatic operations and they are readily available in most parts of the US. Nonetheless, Americans still know little or nothing about the current strengths and deficiencies of our surgical work force. The public also is poorly informed about the negative forces degrading the surgical practice environment. These and other factors conspire to complicate the availability of safe surgery in the US.

My vantage is that of a surgical educator with a unique background and experience with coaching and skills teaching. Throughout the book I will return to core ideas critical to patient safety and weave them together as they are interdependent. These include innovation, learning curves, innate talent, aspects of gaining and losing technical competence, individual surgeon training and testing and the educational theory related to our current concepts of surgical education. (12,13)

The laparoscopy gallbladder course I took in 1990 was one of several offered across the US. It marked the beginning of a modern surgical revolution. It launched a redirection of my personal journey as an active participant in the changing world of surgical education. Through the telling of the story of the rise of laparoscopic general surgery, I will explore the history of surgical competence and the variability of individual surgeon capability at the beginning of the twenty-first century. It's not entirely what you might imagine.