Clinical Interventional Radiology: Parallels with the Evolution of General Surgery

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ABSTRACT

Parallels between the evolution of surgery into an accepted clinical specialty and changes in the practice of interventional radiology (IR) have been drawn. Technical advances have mandated a change in the role of interventional radiologists from diagnostic radiologist to that of the treating physician. The development of “modern” IR is an accelerated repetition of the evolution of “modern” clinical surgery. The resistance or delay of some to accept IR as a clinical specialty is a duplication of the resistance to accept surgery as a clinical specialty by medicine in general. It is clearly time to understand that the benefits the interventional radiologist brings to the patient far exceed his ability to synthesize imaging data with catheter skills. Those of us who have accepted this can take some comfort in the fact that we now tread a path already proven in its destination.

KEYWORDS: Barber-surgeons, revolution, clinical practice

Objectives: Upon completion of this article, the reader will (1) gain an understanding of the parallels between the development of surgery as a clinical discipline and the transition of interventional radiology to a clinical discipline and (2) apply this understanding in promoting the clinical practice of interventional radiology.

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EVOLUTION OR EXTINCTION

General surgery and its subspecialties are accepted as clinical fields by medical practitioners both within and outside surgery, but this was not always so. General surgery began as a technical specialty, in many ways subservient to the nontechnical practitioners at the time (i.e., to internists). Parallels between the evolution of surgery into an accepted clinical specialty and changes in the practice of interventional radiology (IR) have been drawn.¹ Though interventional radiologists recognize the necessity of innovation in their specialty,² acceptance

of the ultimate innovation, transformation into a clinical specialty, is now more important than ever. The intent of this brief review of the development of surgery as a clinical entity is to provide a frame of reference through which to view analogous developments in IR. An understanding of these parallels suggests that this evolution to a clinical specialty can be the key to the continued development of the specialty of IR. The evolution of IR toward a true clinical specialty is well underway. This transformation should be viewed positively in light of the historical precedent of general surgery's evolution.

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ANALOGOUS EVOLUTION AND SURGICAL ANTECEDENTS

Cicero stated in 80 B.C. that “[to not know] what happened before one was born is always to remain a child.” Owen Wangenstein, M.D., former Regents Professor of Surgery at the University of Minnesota, used this quote in warning his fellow surgeons in 1975 that a failure to recognize the propensity of history to repeat itself would be a grave detriment to the continued development of modern surgery.³ Though he saw the value of this quote in advising his surgical colleagues to understand their own history’s lessons, an understanding of surgical history may allow interventional radiologists to avoid a repetition of our surgical colleague’s struggles. Wangenstein reminded his contemporaries that there had been a lack of social and public acceptance of surgeons as true “healing physicians” throughout much of surgery’s early history. He illustrated this historical lack of acceptance of surgeons as clinicians with a description of Ambroise Paré (1510–1590), the famed surgeon of the 16th century. He noted that Paré, later to become one of the seminal figures in the development of surgical care, was initially denied a place in the medical faculty of the Université Paris because he had risen from the ranks of the lowly “barber-surgeons.”

The barber-surgeons were viewed by the physicians of their time as unlearned and to be held in low esteem.⁴ For many centuries the barber-surgeons were viewed by western society as partially trained, low-ranking haircutters and bloodletters. Their societal rank was far below that of the “learned” physicians of their day who possessed a degree after long perseverance at University. In fact, late into the 18th century at many London hospitals surgeons could only operate after the patient had previously been seen by a “physician” and permission for operation granted.⁵ Surgical historians give credit to the barber-surgeons for the earliest attempts at moving from artisan to clinician by forming guilds to increase their autonomy in caring for patients.^{5,6} Wangenstein asserted that for his contemporaries to maintain the forward momentum initiated toward clinical general surgery centuries ago, his modern-day surgical peers needed to fully appreciate the origins of their specialty as technicians for whom social acceptance as “physicians” was hard won. Interestingly, he also noted that the greatest catalysts in the growth of modern surgery—anesthesia, antisepsis, and antibiotics—occurred as collaborations with other medical disciplines. He concluded by reemphasizing the need for surgeons to recognize the absolute interdependency of all branches of medicine on each other to advance. In questioning what the next “great catalytic forward thrust” would be for surgery, he could not have predicted that it might come in the form of minimally invasive, image-guided therapies. In any case, the analogy be-

tween the historical societal perception of a division between the barber-surgeon and the physician and the modern perception of the interventional radiologist as nonclinician is clear. The lessons to be learned from our surgical colleague’s history should be equally apparent.

REVOLUTION

From the very earliest period of the development of general surgery until the early 20th century, surgeons were perceived as skilled artisans or technicians and were not afforded the same respect as the physicians (internists) of their time. A paradigm shift occurred after this time, which altered the societal perception of surgeons as technicians requiring physicians to oversee and in many cases approve their treatment to an acceptance of them as the patient’s primary caregiver. The circumstances that allowed this transition are not isolated to the early 20th century and more importantly are not unique to the evolution of general surgery.

Major shifts in the societal perception and acceptance of the role of the surgeon-physician occurred during the mid-19th century and into the early 20th century. This has been previously described as the “Victorian revolution in surgery.”⁷ This revolution, which occurred between the mid-1840s and mid-1890s, can be viewed in light of three major events. These events are the development of successful and useful general anesthesia, the adaptation and acceptance of antiseptic techniques, and the development of X-rays.⁷ The components of the revolution were grounded in these technological innovations and not in any societal demand or scientific need for a change in patient care. The assertion of this thesis is that these technological innovations drove the development of the large-scale medical technological infrastructure in which we now reside. The nature of these advances demanded development of a system where the bulk of surgical care no longer took place at the small shops of skilled artisans but in large hospitals designed for the purpose of patient care. The surgeon-doctor ceased to be an independent skilled artisan and became a component of the corporate medical complex.⁷ His contribution to patient care extended beyond technical craftsmanship and came to include a cognitive component as well. The entirety of his skill could only be applied in the hospital environment.

The fact that the Victorian surgical revolution was driven by the emergence of several technical innovations provides a clear parallel to the changes we have witnessed in the practice of IR. The technological advances of antisepsis and anesthesia allowed the possibility of more complex surgical procedures with higher success rates.^{8,9} Consequently, the surgeon needed to evolve from lancer and bloodletter to skilled operating physician.

In a similar fashion, the explosion of technological innovations in catheter and image-guided therapies has propelled the practice of IR from its roots as a collection of diagnostic imaging “procedures,” or tests, to its current state. Technical advances in interventional devices and techniques have mandated a change in the role of interventional radiologist from diagnostic radiologist, dabbling in invasive “special procedures,” to that of the treating physician.

If anything, the start of IR as part of an established, hospital-based medical specialty is comparatively auspicious. The need to move from technician to caregiver can be understood from this frame of reference. The surgeon of the late 19th and early 20th centuries, by nature of his unique vantage point as the sole practitioner with a full understanding of his “new” complex procedures, had no choice but to take charge of his patient both preoperatively and postoperatively and not simply during the “surgery.” He was after all best equipped in all ways to fully manage his patient’s care, the centerpiece of which now happened to be his operation. The interventional radiologists of the late 20th and early 21st centuries finds himself in remarkably similar circumstances.

CLINICAL IMPERATIVE

In 1951 Edward Churchill, former chief of surgery at the Massachusetts General Hospital, wrote in *The New England Journal of Medicine*,

The trend illustrated . . . is the most significant feature of 20th century surgery and has rapidly been gaining headway . . . [I]t is a trend that cultivates the discipline of the mind that is needed to compliment and guide surgical technology. It is a trend that re-establishes the *surgeon* as a biologist and as a *physician* in the broad sense of one skilled in the healing arts, . . . breaks down the sterile isolation of the surgeon at the operating table and encourages him to *travel in the company with others*; with the *internist*, physiologist and the chemist.¹⁰

One need only substitute the words “interventional radiologist” for “surgeon” and “fluoroscopic table” for “operating table” in the statements above to see that just 50 years ago surgeons recognized the same hurdles recently faced by interventional radiologists. Churchill held the notion that “modern surgery,” as practiced clinically in the late 20th and early 21st centuries, was necessitated by the aforementioned technological innovations, which were a part of the Victorian revolution. His arguments allow a clear parallel to be drawn between the development of general surgery as a clinical discipline and the development of IR. The view sometimes

promulgated that the interventional radiologist lacks the necessary skill, knowledge, and dedication to provide total patient care is remarkably similar to that expressed about general surgery not so long ago.^{11,12}

A half-century ago Churchill described two features of the “new” surgery that he felt distinguished it from late 19th- and early 20th-century surgical practice. One was the introduction of experimental science as a means of providing solutions for clinical problems. The other was the shift in surgeons’ focus from the “local lesion and the operation” to a wider “regard for the more general aspects of surgical disorders.” In other words, he espoused the acceptance *by surgeons* of their role as *physician* to their patients rather than as mere technicians.¹⁰ The development of “modern,” or more appropriately, clinical, IR is an accelerated repetition of the evolution of “modern” clinical surgery. The resistance or in some cases delay of some to fully accept IR as a clinical specialty is a duplication of the resistance to accept surgery as a clinical specialty by medicine in general. Unfortunately, as noted by the physicist Max Planck “Innovation rarely makes its way by gradually winning over and converting its opponents. What does happen is that its opponents gradually die out and that the growing generation is familiarized with the [new] idea from the beginning.”

ACCELERATED PARALLEL DEVELOPMENT

The evolution of interventional radiologist from technician to clinician is similar to that experienced historically by surgery except for its time course. Fortunately for interventional radiologists and the patients they treat, it has taken a mere four decades rather than several centuries. Sir Clifford Allbutt, the noted historian, wrote that “the division of medicine into medicine and surgery had its roots not in nature nor even in natural artifice but in clerical feudal and humanistic concerns.”¹⁰ The historical underpinnings of this division between physicians and surgeons dates back to medieval times. Medical practitioners as early as the 12th century looked down upon surgical procedures and held them below their dignity.^{4,5} This was undoubtedly a result of the church’s considerable part in dictating medical care of the time.¹³ In the early Middle Ages most educated people were clerics. Because only these clerics could read Latin, others were not able to read the few Latin medical texts that were available. This resulted in increasing medical activities by priests, a circumstance that alarmed the church authorities. The church held that a priest who had had blood on his hands was officially barred from higher church office. Consequently, the Council of Tours in 1163 decreed that clergy would not perform surgery.¹³ Further, in 1215 priests, deacons,

and subdeacons were disallowed from performing surgery under penalty of excommunication.¹³ Medical schools, such as the Université Paris, established in the 13th century, were ecclesiastic institutions and therefore were strictly prohibited from providing surgical instruction.⁴ Although the clergy had been banned from performing surgical technique, the Pope's order in 1092, that all clergymen had shaven faces, required that trustworthy men with blades be available to perform the trimming. Monasteries, in turn, trained monks to perform the shaving of their residents and also trained them to perform "bloodletting" by venesection. Regular bloodletting was also demanded by ecclesiastic law of each individual in the clergy.⁴ Consequently, these trained monastic barbers became known as the "razor et minor" or the barber phlebotomists.⁴ The barber-surgeons practiced their trade, which included the cutting and clipping of hair, shaving of beards, and minor surgical procedures such as bloodletting and drawing teeth.⁶ Through these practices and the craft guilds they spawned, the barber-surgeons gained some importance in society.

The earliest guild of barbers and surgeons in Britain was established in 1505 in Edinburgh.⁵ The United Company of Barber-Surgeons received a Charter of Incorporation in London in 1540.⁶ Formation of these "trade-guilds" gave the barber-surgeons near exclusive purview over surgery as well as their more menial, but no less societally valued, tasks. Throughout this time, the barber-surgeons' practice was considered a less-learned vocation by physicians of the time who wore "long robes" versus the "short robes" of the barber-surgeons.⁶ This union of barber-surgeons practiced together for nearly 200 years before the actual separation between barbers and surgeons occurred. The Charter of Incorporation of barber-surgeons had stipulated that barbers no longer perform surgical procedures. The surgeons established an anatomy theater and a course of lectures, which were originally given by nonsurgical physicians.⁶ Over time the lecturing responsibilities were assumed by surgeons. The surgeons slowly bettered the breadth of their medical knowledge until the rift between them and barbers was so wide that they submitted a petition to parliament in 1745, which granted them Royal Assent to become "separated from the gentlemen of the barbers." The Union of Barber-Surgeons was finally dissolved and the Royal College of Surgeons established in 1800.⁶ Clearly the transformation from artisan-craftsman to professional healer was not expeditious or without resistance from the physician establishment elite. The surgeons came to rightfully believe that they had become the best qualified to render the gamut of surgical patient care of which they were now the sole capable practitioners. Thankfully for 21st century patients they persisted in their struggle and prevailed.

Thus, the emergence of modern clinical surgical practice must be viewed as the culmination of many centuries of social, technological, and economic evolution. The changes required to transform the surgeon from skilled artisans with their roots as clerical barbers to learned physicians involved in all aspects of their patient's care did not occur overnight and were resisted at every turn. Nobel Prize-winner Maurice Maeterlinck claimed that "at every crossway on the road that leads to the future it [tradition] has placed against each of us 10,000 men to guard the past."¹⁴ The historical appreciation by physicians of the manual dexterity of the barber-surgeons finds its modern counterpart in their acceptance of the interventional radiologists' skill in producing an exquisitely diagnostic arteriogram. The artifice of a qualitative difference between the "clinicians" of our society and the interventional radiologists, whose clinical acumen revolves around mastery of minimally-invasive "operations," closely resembles the historical artifice described above, which was surmounted by general surgeons.

The clinical revolution in interventional radiology began at its inception in the mid and late 1960s with the technological innovations pioneered by Baum, Dotter, Gruentzig, Doppman, and others.¹⁵ A technological explosion drove the tidal wave of growth in applications of minimally invasive catheter-directed therapies. As the therapies became accepted, it became necessary for their practitioners to show the same concern and care for their patients as shown by the astute surgeons who fostered the clinical transformation and growth of their own field.

CONCLUSION

It is clearly time for physicians, medicine in general, and society as a whole to understand that the benefits the interventional radiologist brings to the patient far exceed his ability to synthesize imaging data with catheter skills to plug a leak or open a clog. More importantly it is time for the interventional radiologist him- or herself to act on this new reality. History shows us that perseverance is imperative if the resistance of the traditional clinician of the day is to be overcome. As the surgeon did in the past, the interventional radiologist must refuse all pressures to shirk his ultimate responsibility to the patient. If this brief review of the historical background to the development of 20th- and 21st-century surgery serves no other purpose for the surgeon, it should at least provide him with a glimpse of his past and a rightful sense of triumph for the sake of his patients. Its purpose for the interventional radiologist is a glimpse of his future. Those of us who have readily accepted the clinical mantle championed by our forbearers can take some comfort that we now tread a path already proven in its destination. History does, after all, repeat itself.

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