

The dawn of the third renaissance in surgery

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In this presidential address, I will share my belief that our proud and noble field stands at the dawn of a great renaissance. I further believe that this is the third such renaissance that has occurred in surgery. As described herein, the first renaissance in surgery occurred during the 1600s, which involved a transformation in operative care unlike anything that had been seen since Roman times. This first renaissance was triggered by tumultuous world events but was spurred on by the invention of the printing press. The second renaissance occurred during the 1980s and was triggered by the invention of the computer, which is of equal significance to the printing press 240 years earlier. I believe that this third renaissance shares with the earlier renaissances its transformative nature and its reaction to turmoil, both in the medical and nonmedical worlds. This is a renaissance driven by science, by creativity, and by innovation—resources that are never in short supply within our great profession. (Surgery 2015;158:317-22.)

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INTRODUCTION: TRANSFORMATIONS IN SURGERY, THEN AND NOW

I'D LIKE TO TELL YOU A STORY about what I believe is a profoundly important, and I would say largely underappreciated, transformation that is occurring in surgery. It is a transformation that offers the promise to alter every aspect of our clinical lives and that has the potential to touch not only how we interact with our patients but to directly influence the type of care that our patients receive. I would like to share with you my thoughts on why I consider us all to be at the dawn of the 3rd renaissance in our specialty's great and storied history.

Before I explain what I mean by the third renaissance in surgery, let's discuss what the term renaissance actually means and why it was specifically chosen now. Webster's dictionary, aka Google, defines the renaissance as, "the cultural rebirth that occurred in Europe from the fourteenth through the middle of the seventeenth centuries, based on the rediscovery of the literature of Greece and

Rome." This was a period that produced important masterpieces that have endured in importance through the ages and include great works of art and architecture as shown here. As we'll soon see, these cultural advances did not occur in a vacuum, yet were achieved after significant challenge and turmoil, turmoil that in many cases spurred these very achievements. So too I hope to convince you that the situation is similar in surgery, in which the current transformation will be seen as a response to turmoil and uncertainty within our field, and in which the turmoil and uncertainty can actually accelerate the pace of change within our profession rather than diminish it.

Now we have seen renaissances before. Note that in the 1970s and 1980s, the great and noble city of Pittsburgh, Pennsylvania, was a hot and smoky town, filled with smoke stack, steel mills, and coke plants. However, with the increase in the costs of locally produced steel and the rapid availability of cheaper steel overseas, the Pittsburgh steel industry collapsed, and with it the Pittsburgh economy fell into ruins. Through a combination of creativity and innovation, Pittsburgh rebounded from the ashes of the steel industry and reinvented itself as a city of science, of medicine, and of beauty.

PAST RENAISSANCES IN SURGERY: HOW DID WE GET HERE?

So I would like to share with you my belief that we are in the midst of a renaissance in surgery that

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follows in the footsteps of 2 renaissances that have come before. As we will see, the first renaissance in surgery occurred during the 1600s, and which involved a transformation in operative care unlike anything that had been seen since Roman times. As I'll also explain, the first renaissance may have been triggered by tumultuous world events, but was spurred on by the invention of the printing press, a pivotal event in world history. The second renaissance occurred during the 1980s, at a time when transformative changes in world events as well as in science were occurring. As I'll share shortly, the second renaissance in my opinion was triggered by an invention of equal significance to the printing press 240 years earlier. The second renaissance was spurred on by the invention of the computer. The third renaissance shares with the earlier renaissances its transformative nature and its reaction to turmoil, both in the medical and nonmedical worlds. As we will see, surgery will grow from this third renaissance stronger than ever, for this is a renaissance driven by science, by creativity, and by innovation—resources that are never in short supply within our great profession.

So why focus on renaissance in surgery, and why at the academic surgical congress? In brief, by examining and understanding the previous surgical renaissances, we may gain insights into where we are now, the challenges that we have ahead of us, and importantly, we may develop strategies to maximize our combined potential in response to these challenges. The Academic Surgical Congress is the perfect venue for this to happen, given the strong representation of all branches of surgery in attendance, and the shared commitment to excellence at the meeting.

WHAT CONSTITUTES A RENAISSANCE IN THE FIRST PLACE?

As we discuss the 3 renaissances in surgery, it is important to define what changes constitute a renaissance in the first place. In my view, there are 3 criteria to be met. First, the changes must be transformative and involve both new thinking and new ideas as a result of that thinking. Second, the changes must be driven by significant challenges that may be present either within or outside the profession. And, finally, the definition of a renaissance must be remarkable even in hindsight, and must thus be able to withstand the passage of time. I posit now that the significant of a true renaissance, such as that which we are at the dawn of, will grow rather than diminish with time.

THE FIRST SURGICAL RENAISSANCE: FROM THE INVENTION OF THE PRINTING PRESS TO THE FIRST TEXTBOOK OF ANATOMY

Let us now turn to findings the first surgical renaissance. As I mentioned previously, I believe the first renaissance in surgery occurred in Europe in the 1600s, towards the end of the cultural renaissance that was sweeping that continent. And so, to understand the first renaissance in surgery, we need to understand the context in which it occurred. In the 1600s, Europe was seething on the verge of collapse. The great capitals were consumed by fire, as typified by the great fire of London in 1666, and by war, as typified by the Thirty Years' War, which involved all the major powers of Europe and which redrew the religious and political map of central Europe, or by the great plague, which caused up to 1,000 deaths per day in London alone.

But Europe came bouncing back. The response to war and fire and disease was the creation of great art, music, and architecture, as typified by the great statues of the day, the great paintings, and the great buildings. But a renaissance doesn't just happen—it has to be made to happen. And the people who made this first renaissance a reality are some of the greatest thought leaders not only of their own time, but of all time: Michelangelo, the great artist, architect, and sculptor; Da Vinci, the great painter, sculptor, musician, and anatomist; and Guttenberg, who links the cultural renaissance in Europe to the renaissance in surgery from which we still benefit from today.

So why was a renaissance in surgery needed in the first place? At the time of the first renaissance, surgery was not only crude, but it was also dated—a pretty remarkable feat considering we are describing medical care more than 500 years ago. Before the 1600s, operative care was based on the ideas of the great Roman anatomist Galen of Pergamum, who lived from 129 to 200 AD. Galen's ideas influenced medical care for more than 1,000 years and were based largely on inferences he made from the dissection of animals, because it was forbidden to dissect the human body. Galen taught that the liver is the source of all venous blood whereas arterial blood originated from the heart. He also taught that disease and moods are a simple consequence of imbalance between 4 bodily fluids, namely blood, yellow bile, black bile, and phlegm, and that restoration of the balance between these fluids would lead to recovery from any sickness. Operative care at the time thus occurred in the context of European

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