Art in Science

Art in Science: *The Gross Clinic* by Thomas Eakins

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For most of recorded history, art has been both an aesthetic experience as well as a method of education and commentary. At times, art illustrates and interprets the world around us, teaches or conveys a message without the need for written language or even literacy, records an historical event, or provides opinion. Some works of art are examples of this

entire spectrum of opportunity. We will use *The Gross Clinic*, a painting by the American artist Thomas Eakins (1844–1916), to explore these concepts (Fig. 1).

The history of medicine has largely been the result of increasingly successful efforts made to find those interventions that appeared to improve health by succeeding generations of doctors and scientists. These incremental steps were often advantageous, but at times, they proved to be disastrous misadventures. Direct anatomical observations during the 15th and 16th centuries, combined with the availability of movable type and paper, provided the first widespread knowledge of man's internal physical nature. This was followed in the 18th century with a superficial understanding of the ways in which those structures (organs) were related to illness. The identification of disease sites and associated pathology became more specific as diagnostic tools were discovered or

invented (such as the stethoscope) or improved (exemplified by the microscope). This was the state of general medical knowledge in the middle of the 19th century – just about the time that Thomas Eakins painted *The Gross Clinic*, in 1875 [6].

The germ theory of disease was known and widely accepted in Europe at this point in time, but was not yet an important influence on medical practice in the United States. American physicians were still waiting for a definitive answer, by their standards, as to whether bacteria caused disease, a controversy that probably cost President James Garfield his life in 1881 [5]. Dr. Samuel D. Gross (1805–1884), author of the most popular surgical textbook of his time, *System of Surgery* in 1859 [4], was not convinced that germs caused infections or made a difference in surgical outcomes. He fully supported America's skepticism, if not disbelief, in the theory put forth by Joseph Lister (1827–1912) in 1867, then working at the University of Edinburgh and leveraging Louis Pasteur's (1822–1895) earlier observations and discoveries concerning the role of bacteria in fermentation and human disease [6, 7]. Nothing documents the American medical attitude of the time better than Thomas Eakins's portrait of

Note from the Editor-in-Chief:

I am pleased to introduce the next installment of "Art in Science," team-written by Gary and Linda Friedlaender. Gary is the Chair of the Department of Orthopaedics and Rehabilitation at Yale School of Medicine; Linda Friedlaender is the Curator of Education at the Yale Center for British Art. Together, they will share observations from a fascinating vantage point: *The interface of art and medicine*.

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Fig. 1 *The Gross Clinic* was introduced to the public in 1876 at the United States Centennial Exposition in Philadelphia, PA, USA. (Republished with permission from the Philadelphia Museum of Art: Gift of the Alumni Association to Jefferson Medical College in 1878 and purchased by the Pennsylvania Academy of the Fine Arts and the Philadelphia Museum of Art in 2007 with the generous support of more than 3600 donors).

the revered Dr. Gross, revealed in the midst of a surgical procedure before an audience of students and other onlookers.

The Gross Clinic is a large work (8 feet in length, and 6 feet 5 inches wide) of oil on canvas. The daunting artwork took Eakins more than a year

to finish. It was introduced to the public in 1876 at the United States Centennial Exposition in Philadelphia, PA, USA, which occurred at the same time as the International Medical Congress hosted by the American Medical Association (AMA). The painting was initially rejected for

inclusion in the Exposition, possibly because of its shocking realism. It was, however, subsequently hung in a relatively remote corner of the exhibit hall, perhaps reconsidered at the urging of Dr. Gross, who had been elected president of the upcoming International Medical Congress [2]. An alternate explanation for the painting's display in an inconspicuous location is that Gross recognized an element of ridicule by Eakins concerning the absence of antisepsis in his surgical practice [7]. Dr. Gross was then professor of surgery at Jefferson Medical College, a position he held since 1856. He had graduated from Jefferson Medical College in 1828, spent time practicing in Cincinnati, OH, USA and then in 1840 moved to Louisville, Kentucky, USA before his return to Philadelphia, PA, USA. He was elected president of the AMA in 1867 and again in 1875 [3].

Thomas Eakins was himself interested in science, especially in the study of human anatomy. He attended the Pennsylvania Academy of Fine Arts, an important art school of the period, where he studied anatomy in 1862 and 1863. He then moved on to Jefferson Medical College where he avidly attended anatomy lectures and surgical procedures. From 1866 to 1869, Eakins studied at the Ecole des Beaux Arts in Paris where he learned traditional academic methods of painting

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and furthered his intense interest in anatomy through the use of nude models as well as animal and human dissections [2].

Samuel Gross's prodigious professional career, both in terms of his widely known publications and his clinical practice, did much to inform the public's knowledge of surgical prowess. Eakins met Gross during his anatomy studies at Jefferson Medical College in 1874. He was inspired to paint a portrait of this important physician at work in the operating theater at Jefferson, depicted before a large

number of trainees and interested laymen [2]. As such, the painting displays Dr. Gross simultaneously as a skillful surgeon and as a respected educator. The patient represented in this scene suffered from osteomyelitis of the femur, and the surgeon's ability to remove diseased portions of bone, avoiding amputation, contributed to Dr. Gross' reputation.

While this life-sized painting documents this procedure clearly, it also demonstrates the complete lack of aseptic technique. Gross never published his personal experience with

respect to postoperative infection, but the generally reported mortality rate in Philadelphia at this time, about 25% to 30% [6], was overwhelmingly due to infected amputations.

It was not until 1887 that American physicians largely accepted the germ theory, and Eakins' later painting entitled *The Agnew Clinic* (1889) (Fig. 2) presents an entirely different scenario from *The Gross Clinic* in this regard. D. Hayes Agnew MD (1818–1892), professor of surgery at the University of Pennsylvania, was a strong proponent of antisepsis and was

Fig. 2 *The Agnew Clinic* by Thomas Eakins, oil on canvas, 1889. Agnew and his team are dressed in white coats, rather than the street clothes worn by Dr. Gross in *The Gross Clinic*.

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sought to care for President Garfield following his fatal gunshot wound in 1881 [1]. Eakins captured the respected surgeon and his team dressed in white coats, rather than the street clothes worn by Dr. Gross. Agnew's patient is similarly draped and the surgeon's instruments are antiseptically stored in a box used for such purposes. In surviving photographs, Dr. Agnew can be seen using antiseptic spray (carbolic acid) during his surgical procedures.

Again, a total lack of soon-to-be-conventional sterile technique may reflect Eakins' desire to report accurately the state-of-the-art of surgical practice at the time, or perhaps highlights a criticism by the artist of the surgeon. Either way, Eakins does not hide the surgeon. In fact, the most striking feature of *The Gross Clinic* remains Gross himself. Eakins' placement of the surgeon in full figure, just left of center at the front of the picture, and his use of lighting to focus our attention on his hand and his head, or figuratively on his skillful hand and his powerful intellect, define his supremacy in his field.

Next to Gross, the anonymous patient seems of secondary importance, but defines the scene as an operation in progress. The patient's head is at first hard to find. Its discovery, beneath an ether mask, helps in orientation of the body and in identifying the presence of the anesthesiologist at the head of the table.

The incision is longitudinal across the left lateral thigh, approaching the infected femur. While graphic in its own right, the depiction of the operative site pales in comparison to the bloody hand of the surgeon and his scalpel. The patient's mother, on the far left and dressed in black, demonstrates her agony with a raised hand, fingers coiled as if a claw. Eakins purposely puts both these hands close to each other for the viewer to compare the importance of the rational over the emotional in the scientific theater. The surgical instruments of the day are displayed at the bottom foreground of the painting and in the hands of the surgeon and his assistants.

The amphitheater is filled with attentive and appreciative students at desks in the upper half of painting, with a scribe in the front row recording Dr. Gross's every word and seated right behind him. The artist has inserted himself, leaning forward, pencil in hand, against the far right wall of the exit ramp. Lighting is provided by sunlight, reminding us that surgery could only go forth in this manner on sunny days. The artist also creates a set of diagonals reaching from the lower right corner of the scene, up the operating table to Gross's head, and down to the patient's mother's hand, and, finally, across the front of the picture plane and back to the gurney, making clear the essentials of the painting's focus.

Despite the public's initial difficulty in witnessing the drama of the operating room experience, the technical expertise of Eakins was well-recognized by the art community. He demonstrated with remarkable clarity the skill, the intellect, and respect attributable to Dr. Gross, and to surgery in general. He has provided a record of the surgical scene, largely unknown to the public, including the breadth of participants and, importantly, the state-of-the-art of surgical practice at an important academic medical center, just as the United States was celebrating its first 100 years as a nation. Whether an acknowledgement of what can be accomplished through surgery in 1876 or what was being ignored by those entrusted with the health of the public, the painting remains an important chapter in the history of medicine. And as great art often strives to do, Eakins has made his narrative a timeless lesson for all who choose to look.

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