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Historical Vignette

Mark M. Ravitch MD: Surgeon, author, teacher, soldier

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ABSTRACT

Mark M. Ravitch (1910–1989) was the most prolific surgeon–author of the 20th Century as well as an outstanding clinical surgeon, scholar, historian, and researcher. While today he would not be considered a "pure pediatric surgeon," he was a charter member of the American Pediatric Surgical Association and received the William E. Ladd medal from the Surgical Section of the American Academy of Pediatrics and the Denis Brown Medal from the British Association of Pediatric Surgeons. He contributed to the treatment of benign colon and rectal disease, intussusception, and chest wall deformities. His most enduring contribution was surgical stapling, a technology that he brought from Russia during the Cold War that opened the door to minimally invasive surgery.

Contents

1. Upbringing, education, and early career

Mark Ravitch's parents were émigrés from Russia. His father, a Menshevik, had been in prison and had left the country a step ahead of the Czarist police. His mother was a dentist, and the family lived in the Bronx. While he was a student at the University of Oklahoma in 1928, he and his mother visited relatives in Moscow. His ability to speak Russian helped in obtaining Russian surgical stapling instruments.

Ravitch graduated from the Johns Hopkins University School of Medicine in 1934 and stayed for a one-year surgical internship. He then spent a year on pediatrics and another in pathology before starting a surgical residency at Hopkins under Dean D. Lewis, who had followed William S. Halsted as the surgeon-in-chief. While still a house officer, he started the blood bank at Hopkins, and one of his first papers reviewed the history and techniques in the blood bank [1]. Lewis retired in 1939, so Ravitch finished his surgical training under Alfred Blalock.

Once Ravitch asked if the department could buy a Von Petz stapling device for gastric surgery. Blalock said the instrument was too expensive. Ravitch tried to suture with an ordinary paper stapler in the animal laboratory. It didn't work, but the story indicates his early interest in surgical staples.

In 1943 he was commissioned as a major in the US Army Medical Corps. After his first assignment in England, he followed the D-Day invasion to Normandy, then Liege, Belgium. With scrounged supplies Ravitch set up a hospital in a cavalry school [2]. During the Battle of the Bulge he operated on wounded soldiers for 72 h without interruption. At the end of the war, he returned to Hopkins, first as a senior resident, then as a professor of surgery and director of the blood bank.

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2. Sphincter-preserving resection of the anorectum

From 1946 to 1952 he published several landmark papers related to pediatric surgery. His article, "*Anal Ileostomy with Preservation of the Sphincter*," described the mucosal proctectomy, total colectomy, and ileoanal anastomosis for benign diseases of the colon, such as familial polyposis and ulcerative colitis [3]. Revolutionary at the time, the operation avoided a stoma and became a standard procedure for benign diseases of the colon and rectum.

3. Hydrostatic reduction of intussusception

His interest in intussusception began when he was a third-year medical student. After his return from the war, he resumed his research on the condition, which included creating intussusceptions in 28 dogs. The study, complete with cultures of the intestinal serosa and histologic studies, demonstrated the effectiveness of hydrostatic reduction. This experimental work resulted in "*Reduction of Intussusception by Hydrostatic Pressure*" published in 1948 [4]. His clinical study in infants, "*Intussusception in Infants and Children: Analysis of 152 Cases*," demonstrated both a lower mortality and morbidity with barium enema reduction than with surgery [5].

Prominent surgeons, such as Robert E. Gross of Boston and Willis J. Potts of Chicago, had achieved a near-zero mortality with surgical treatment and dismissed his technique of hydrostatic reduction. There were concerns about incomplete reduction, intestinal perforation, or missing lead points. Ravitch followed in 1959 with the publication of a 119-page monograph, "*Intussusception in Infants and Children* [6]." With superb illustrations, dozens of radiographs, and scores of references, it discussed every aspect of intussusception and became the definitive study on the condition [6]. Today retrograde reduction by air, saline, or barium is the standard of care.

4. Operations for chest deformities

There had been a variety of operations for patients with severe chest deformities. Most surgeons looked upon pectus excavatum as a cosmetic problem and did not advise an operation. In 1949, Ravitch published detailed case histories with pre and postoperative X-rays on eight children, ranging in age from 22 months to ten years whom he had operated upon for pectus excavatum [7]. He resected the deformed costal cartilages and did a transverse anterior wedge osteotomy of the sternum, with mattress sutures holding the sternum in place [7]. As part of his research on the chest wall, he dissected over a hundred bodies to understand the anatomic pathology.

He used external traction with wire sutures in two children. One, who had preexisting bronchiectasis died with overwhelming sepsis, which Ravitch attributed to surgical error. He never again used external traction or substernal bars. Despite the complication he advocated surgical treatment for pectus excavatum, citing reduced exercise tolerance during the teen years and cardiac symptoms later in life [8,9].

His 1977 monograph, "*Congenital Deformities of the Chest Wall and Their Operative Correction*," is a review of his thirty-year experience with pectus deformities as well as Poland's syndrome, ectopia cordis, and Pentalogy of Cantrell, a comprehensive, well-illustrated text that confirmed his position as the world authority on chest wall deformities of the mid-20th century [10].

5. Surgical stapling devices

In 1958, the Soviet Union was essentially closed to the outside world. Rumors that its surgeons had developed techniques for the prolonged storage of blood aroused the interest of the US National Research Council. The council chose Ravitch as one of the scientists to study blood banking techniques in Kiev in Ukraine, then part of the Soviet Union. The Soviet officials were uncooperative, but he managed to visit their hospital for thoracic surgery.

He struck up a friendship with its surgeon-in-chief, Nikolai Amosov. The administrators prohibited visits to patient wards, but Amosov brought the patients and their X-rays to his office. Ravitch later wrote, "The very first patient proved to have had a resection of the right upper lobe of the lung, and in the X-ray I could see what was obviously a line of metal staples [11]." Amosov had used a stapling instrument to close the bronchus and seal the blood vessels in more than 200 lung resections. Ravitch was further impressed when he observed Amosov perform lung resections with the stapler.

The government refused to allow him to have a copy of the films that showed the staples in place. Ravitch believed that obtaining a device was out of the question. By chance, he found a surgical supply store in St. Petersburg that welcomed him despite his being a US national. His ability to speak fluent Russian allowed him to ascertain that the stapling devices were indeed for sale, so he bought all he could. Upon his return to America, Ravitch, as the surgeon-in-chief of the Baltimore City Hospital, practiced in the animal laboratory, then used the stapler on lung resections in patients with tuberculosis. There were fewer bronchial fistulas with closure by staples than with sutures. With his chief resident, Felicien Steichen, Ravitch presented his experience with surgical stapling.

American surgeons were skeptical of the reliability of stapling devices and whether they offered any benefit over hand-sewn techniques. During the 1960's, Ravitch and Steichen worked with the newly formed United States Surgical Corporation to develop the TA and the GIA instruments for anastomoses of the esophagus, intestine, and rectum. As an example of his integrity, Ravitch never accepted royalties from the company, only that they support his research on the use of stapling devices in surgery.

When he was appointed Surgeon-in-Chief of the Montefiore Hospital in Pittsburgh In 1970, Ravitch brought Steichen with him. They organized seminars and workshops all over the world to teach stapling techniques. Stapling instruments appropriate for insertion through laparoscopic ports opened the door for minimally invasive surgery.

6. Publications

Ravitch was the author of 453 papers, 101 book chapters, and 22 books, and was the editor of many medical journals. Before the founding of the *Journal of Pediatric Surgery*, he edited a section on pediatric surgery in the journal *Surgery* that featured a few articles from the field. In 1974 he predicted that increased numbers of pediatric surgeons in the general population would decrease the workload in training centers [12]. His prediction has proven to be true.

Ravitch, with Kenneth Welch, William Mustard, Clifford Benson, and William Snyder, coedited the two-volume multiauthored textbook, "*Pediatric Surgery,*" that continues to be the definitive reference for pediatric surgeons [13]. One of his greatest works was "*A Century of Surgery: The History of the American Surgical Association, 1880–1980* [14]." This review of selected presentations at the annual meetings of the Association documents landmark achievements in the field and is a must-read for anyone interested in the history of surgery.

7. Reminiscences

My [M.R.] first meeting with Dr. Ravitch was in 1969 when I was a third-year resident at the Cook County Hospital on a rotation with the University of Chicago surgical service. I made rounds and scrubbed with him on a number of cases, including children with pectus excavatum.

When I started my residency in pediatric surgery at the Pittsburgh Children's Hospital in 1972, Dr. Ravitch had been in Pittsburgh for two years. Even though he was chief at the Montefiore Hospital across the University of Pittsburgh Medical Center campus, he still held a weekly conference with the residents. If a resident said a finding in the history

or physical examination was normal, Dr. Ravitch would ask, "What exactly is normal?" not letting the trainee off the hook.

Dr. Ravitch never knew what cases would be presented, but after hearing the signs and symptoms, he would give his differential diagnosis, the workup, and the appropriate treatment. He was always spot-on.

I operated with him at the Children's Hospital of Pittsburgh at least a dozen times. He was not a fast or highly-skilled surgeon. His dissections for the pectus operation were meticulous, and he always had good results. He taught us how to scrub by coating our hands and forearms with lamp black. It took at least ten minutes to get rid of the lamp black.

If, in answer to his questions, the resident knew how to diagnose and treat intussusception, he would give him his monograph on intussusception. I was fortunate. He gave me a copy of his delightful book. Dr. Ravitch had a broad knowledge of surgery. He spoke and wrote in twelve languages, so he could read foreign manuscripts without resorting to translations.

8. The "Surgical Curmudgeon"

Aside from his imperious bearing in conferences he was warm, thoughtful, bright, generous, and helpful. He offered me an opportunity to work in his lab, but the doctor draft was still on, and I had to go into the Navy.

When I took the first pediatric surgery board examination in Puerto Rico, Dr. Ravitch was in the row in front of me, smoking a huge cigar. It was a multiple-choice examination. During the exam he broke the silence. "I did all the research on this question, and the correct answer is not one of the choices," he said in his very loud voice. "This test is a joke."

While he did not have formal training in pediatric surgery, he had an abiding interest in pediatric surgery from his years as a resident in pediatrics at Johns Hopkins. When Alex Haller, who would become surgeon-in-charge of pediatric surgery at Johns Hopkins, was a student there, he told Dr. Ravitch of his interest in pediatric surgery. The professor said, "Alex, I'm not sure there is such a thing as a pediatric surgeon alone. I look upon pediatric surgery as an interest area in surgery, but I don't think you can make a living as a pediatric surgeon [15]." The only time Ravitch restricted his practice to pediatric surgery was during 1966–1969 when he was the chief of pediatric surgery at the Wyler Children's Hospital of the University of Chicago.

I doubt whether Dr. Ravitch could adjust to the current milieu of pediatric surgery. In his writings, he referred to surgeons as men. When he was a visiting professor at the Baltimore City Hospital during the 1970's, Susan Luck was a surgical resident and held the retractors while he operated with the chief resident. During the operation, he called Dr. Luck, "Honey."

A collection of his essays, "*Second Thoughts of a Surgical Curmudgeon*," published a year before he died in 1989, is a series of essays and observations on everything from education to ethics [2]. In one passage he summed up his philosophy of surgery: "Surgery is an intellectual discipline characterized by operations and defined by an attitude of responsibility towards the care of the sick." It is difficult to imagine a more succinct description that captures both the technical nature of the field and its attitude of professionalism.

He was critical of modern education. He was especially frustrated by the inability of students to express themselves in English. He was skeptical of fetal surgery and specialization within surgery. He thought terminal patients should not be sustained by useless life support but allowed to die with dignity. He believed that parents with their physician should decide the fate of babies born with severe anomalies. He derided the idea of limiting the working hours of house staff and ridiculed "informed" consent. Some may say that we need more "straightforward surgeons" like Dr. Ravitch, unafraid to voice controversial opinions.

Ravitch was pediatric surgery's connection to an era of surgery long past, of Blalock, part-time surgeons of extraordinary devotion to the field and children, and wartime surgery undaunted by long hours and fatigue. His genius for innovation and prolific record of publications were early features of pediatric surgery in its modern form.

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