

The Dawn of Modern Pathology

Fernando Peixoto Ferraz de Campos^a

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Karl von Rokitansky (1804-1878)

The declining rate of autopsies worldwide, which has been observed in recent decades, has been extensively debated. Although many reasons have been suggested for the genesis of this unfortunate process, none is convincing.

The history of medicine is far from being a linear progression of discoveries. Twists and turns occurred, which, over time, completely changed the current concepts. One of these turns was based on the wealth of knowledge acquired through the observation of thousands of autopsies. Paradoxically, in our day

and age, the medical procedure of autopsy is often considered to be unimportant and sometimes even worthless.

Surprisingly, in the 19th century—more than 200 years ago—the practice of autopsy was met with hostility, not only from the general public but also from some of the medical community. It would take the untiring work of a remarkable man, in Vienna, to change the future of medicine thanks to the knowledge he gained through his determination, dedication, and belief of the truth that autopsy would reveal.

^a Internal Medicine Division - Hospital Universitário - University of São Paulo, São Paulo/SP – Brazil.

Maria Theresa (1717-1780), sovereign of the Austro-Hungarian Empire, started her 40-year reign in the middle of the 18th century after the death of her father, Emperor Charles VI (1685-1740). She ruled by the counsel of her advisors and contributed to financial and educational reforms as well as promoted greater unification of the Habsburg monarchy. According to recommendations by Dr. Gerard van Swieten [long-time student of Hermann Boerhaave (1668-1738), brought from Leyden University – Holland, imperial personal physician], the Vienna General Hospital (The Allgemeines Krankenhaus) was rebuilt. Viennese medicine had first attained international significance through its incentives. Similarly, following van Swieten's advice, Maria Theresa signed a decree making it mandatory to autopsy every hospital death (the motivation for this decree was the high infant mortality in Austria, mostly in the city of Graz). This practice continued—especially for forensic cases—into the following century. This decree (still theoretically in effect in Austria, but no longer strictly followed) led to many morphologic observations that contributed immeasurably to the development and progress of modern medicine.

In the early part of the 19th century, the Austro-Hungarian Empire showed many societal defects precipitated by the Napoleonic wars. Emperor Francis II (who succeeded his father, Leopold II, the King of Belgium, who was the son of Maria Theresa) dissolved the Holy Roman Empire, and suffered various defeats until Napoleon's abdication in 1815. When Francis II died, his son, Ferdinand, who tried unsuccessfully to enhance the power of the throne by leaving an heir, was depicted as feeble-minded and incapable of ruling, which left the actual carrying out of government affairs to the austere Klemens Wenzel von Metternich. Ferdinand eventually abdicated in favor of his nephew, Franz Josef, who, somehow — and despite many military disputes — proved to be a progressive and powerful ruler of the Austro-Hungarian Empire during the second half of the 19th century. Metternich and Franz Josef concentrated on military initiatives to reinforce the Empire, while allowing society to pursue a variety of intellectual activities.

In the midst of this political scenario, in 1804 Karl von Rokitansky was born in Königgrätz, a city in Bohemia (formerly part of the Austro-Hungarian Empire), which is currently called Hradec Králové,

and is part of the Czech Republic. He lost his father early in childhood and sustained significant financial difficulties during that time along with his mother and three siblings

In spite of those difficulties, he completed primary school at his hometown before moving to Prague where he continued his education and graduated from secondary school at the age of 14 (in 1818). He started his advanced studies in philosophy, which was the usual preliminary to a course in medicine, and was greatly influenced by the contemporary philosophers Kant, Schopenhauer, and Schiller. In 1822, still in Prague, he began his medical studies, but two years later he moved to Vienna to live with his uncle and finish his medical studies there.

Highly dedicated, self-taught, and skeptical of ancient medical concepts, early on Rokitansky focused his interest in anatomy, and was substantially influenced by the publications of Jean-Frédéric Lobstein (1777-1835), Johann Friedrich Meckel (1781-1833), and Gabriel Andral (1797-1876). He started working as a trainee in the poorly equipped and underdeveloped pathological institute of the Vienna General Hospital. At the age of 24 he attained a doctorate in medicine after defending a thesis dedicated to the vaccination against smallpox (*De variolide vaccinica*), which had been a plague in Europe until the end of the 18th century, when Edward Jenner's experiment was successfully developed (the cowpox inoculation — the cradle of immunology).

The professional debut of Rokitansky took place in the morbid anatomy institute, which was considered as little better than a hut in a corner of the Vienna General Hospital (described by Rokitansky as "a cabin inhabited by few settlers"). The young Dr. Johann Wagner, who found the institute entrusted to a museum servant, had been recently put in charge.

As assistant to Dr. Johann Wagner (1800-1832), he helped to perform the autopsy of Ludwig van Beethoven (1770-1827). Aloys Rudolph Vetter (1765-1806) and Lorenz Biermayer (1778-1843), previous physicians in charge of the morbid anatomy institute, had abandoned their posts of prosecutors many years before, because of the indifference of the profession and the opposition by many at that time. Adolf Kussmaul (1822-1902), in a visit to Rokitansky described the prosecutory as a small house, where—besides a chamber to store the corpses — there was

one room for autopsies and another for the court. Rokitansky subsequently devoted his whole life to pathologic anatomy, almost entirely in Vienna, and ultimately became one of the most important physicians of his time.

Wagner's teaching led Rokitansky to develop the techniques he subsequently used in the performance of as many as 30,000 autopsies. After the early death of Wagner from tuberculosis in 1832, Rokitansky succeeded him and in 1834 was appointed as a temporary Professor of Pathologic Anatomy.

The Viennese School of Medicine that had flourished in the previous century was in decline, and morbid anatomy had scarcely bloomed at all. Rokitansky was also appointed Associated Professor of Pathological Anatomy of the Vienna School of Medicine. The health service was under imperial sponsorship (in a period of constant territorial disputes), and although the general hospital was rebuilt and expanded, the old Vienna School somewhat stagnated.

At the beginning of the 19th century, autopsies generally concentrated on one organ, typically chosen by a clinician, and, as a general rule, were carried out without a specific methodology and left many organs unexamined. Rokitansky accepted the challenge to develop pathology to serve clinical science in keeping with the Giovanni Batista Morgagni (1682-1771) practice of clinico-pathological correlations — an approach augmented by Mathew Baillie (1761-1823). Even as a novice pathologist, Rokitansky began observing the appearance of morbid diseases at different stages and developed new concepts of pathogenesis, which were of great value for physicians at the bedside. He demanded that the autopsy findings be integral to clinicopathological correlation, and developed advanced nosology — attempting to understand the process of disease from the beginning to the end. Years later, he demonstrated the applicability of clinicopathological correlation to accurately diagnose patients. Rokitansky descriptions not only contained the pathological epicrisis but also the implications on diagnosis and therapeutics.

At first he was confronted with persistent opposition; however, as the validity of his concepts became better understood, he ultimately became pre-eminent in the Viennese physician community. Destructive comments and some written statements threatened the development of Rokitansky's work,

such as "*in most cases, the necropsy relates to the clinical history like glasses to a blind eye; they have no meaning for one another*" (written in 1809, cited by Erna Lesky); and "*I set but little value on the minute examination of the traces left by disease on our organs though that pursuit has been pompously styled pathologic anatomy. The lesions found at our autopsies are frequently produced after death, and consequently the plan hitherto followed in such inquiries is fallacious, and can only lead to vague information and error.*" (François Magendie's declaration in 1839).

Unlike the practice in all other European and North American medical centers, where dissections were restricted, Rokitansky had the unique situation of having endless study material since all diseases and cases for autopsy were referred to the Vienna General Hospital.

He developed a special technique to expedite the examination and dissection of many corpses brought daily to the autopsy room, particularly because there was neither a preservation mechanism nor any refrigeration. It has been estimated that he performed more than 30,000 autopsies and reviewed another similar amount — if not more. These estimations are based on the number of hospital beds, the mortality rate, and uninterrupted work for 6 days of the week for the period that Rokitansky was in charge of the prosectory. However, this number is considered to be underestimated by John Talbot and Erna Lesky, two renowned medicine historians, attesting that this number did not take into account: (i) the period when Rokitansky was busy with many administrative duties; and (ii) the forensic autopsies. The burden of knowledge stemming from such experience was translated and immortalized in the three-volume *Handbook of Pathological Anatomy (Handbuch der Pathologischen Anatomie)*, published in Vienna during 1841-1846, the subsequent editions of which were less successful since they were not in keeping with Virchow's groundbreaking concepts.

The New or Second Vienna Medical School was founded and centered on Rokitansky's autopsy table, which also counted on the aid of the clinician and his lifelong friend, Joseph Skoda; the dermatologist, Ferdinand von Hebra; the surgeons, Franz Schuh and Theodor Billroth, who laid the foundations of modern surgery; and Ignaz Philipp Semmelweis, the pioneer on antiseptics with the discovery of the

etiology of puerperal fever. In 1848, the doctors' revolution forced the resignation of Metternich, transforming the theretofore-reactionary system into a "new era" when teaching and the science became free. From that time on, the Viennese Medical School lived the most scientifically fruitful epoch; scientific discussions and publications proliferated with the work of the younger members of the faculty. The quality of training, by means to access to patients and corpses, in the Medical School attracted students from all over Europe and other continents. Rokitansky was promoted to Chairman of Pathological Anatomy, and the discipline became a compulsory subject in the University of Vienna. In his inaugural lecture in 1844, he insisted on the importance of close contact between the pathologic anatomy and the clinical departments. From then on, he became Dean of the Medical Faculty (by open election), President of the Medical Society of Vienna, Rector of the Vienna University, and Medical Adviser for Culture and Instruction appointed by the Emperor.

Rokitansky, a taciturn man of melancholic personality and of contemplative and introverted character, was a scientist and a physician who, despite having limited resources for most of his professional life, achieved scientific excellence through tireless dedication. He left his mark in many studies and discoveries, and is one of the physicians who changed the history of medicine.

Karl Rokitansky died in Vienna on July 23, 1878. He had been greatly bothered by bronchitis and angina. The uncertain cause of death was reported as myocardial ischemia or asthma. Ironically, the man who performed more than 30,000 autopsies was not autopsied himself.

The modern pathology, in fact, started with Rokitansky's work, which was essentially based on gross pathology. Later, the studies of Rudolph Karl Virchow, which were extensively based on microscopy during the last quarter of the 19th century, supplemented and expanded Rokitansky's contributions. However, Rokitansky used the microscope on a very limited basis as this was not the focus of his work. He described common diseases and recognized new ones as well as establishing the concept of the "disease process" by observing different stages of pathological change. However, to a degree, Rokitansky had traditional views of the etiology of diseases until Virchow proclaimed

that disease originated in the cells and not in the four humors. In spite of his greatness, Rokitansky — the last word in pathology at that time—was a humble man, and recognized the revolutionary correctness of Virchow's concepts and publicly proclaimed that he had been wrong in many of his teachings and that the young Berliner, Virchow, should be followed.

We should not forget that as the Dean of the Medical School and the Rector of Vienna University, Rokitansky had enormous influence in improving medical service and teaching. Prior to the 19th century, various hospitals around the world, such as the Hôtel-Dieu Hospital in Paris, the Chelsea and Westminster Hospital and Guy's Hospital in London, the Charité Universitätsmedizin in Berlin, the Pennsylvania Hospital and the New York Hospital in the USA, were focused on the basic care of the sick. Although already rebuilt in the 18th century, in the 19th century the 2000-bed Vienna General Hospital became one of the largest hospitals in the world, the practices of which affected institutions throughout Europe and the Americas because of its commitment to medical innovation, discoveries, and education. These important changes are also certainly credited to Rokitansky's endeavor.

Although Austria was recovering from two serious military defeats at the time, Rokitansky's adult life took place in the city of Vienna, which became the greatest cultural city in Europe, attracting nearly 2 million people. Eric Richard Kandel (winner of the Nobel Prize in Physiology/Medicine in 2000) wrote that "liberal laws, of those days, were responsible for the outstanding cultural and intellectual flowering in Vienna," allowing for the free expression of the ideas and artistry of a diverse group, which included Sigmund Freud, Arthur Schnitzler, Johann Goethe, Gustav Mahler, Gustav Klimt, and Oscar Kokoschka, as well as the brothers Franz and Ferdinand Schubert and Johann and Richard Strauss.

Physicians in the 19th century occupied the highest rung on the social ladder, although effective therapies were still limited. Bloodletting was the most common way of treating fever, mercuric chloride was the most prescribed drug, and surgery was unbearably painful until 1846 when ether anesthesia first appeared. Tuberculosis was a dreaded urban disease. It was so prevalent that it was considered by many to be a hereditary disease.

The 19th century also saw outstanding medical contributions in other cities by physicians who would also be renowned, including Richard Bright (who understood end-stage renal disease), Thomas Addison (who described pernicious anemia and the degenerative disease of the adrenal glands), Thomas Hodgkin (who recognized lymphoma and expanded the concept of the Morgagni autopsy), George Budd (author of one of the first English-language liver disease texts, describing what would become Budd-Chiari syndrome), and the English naturalist Charles Darwin (who published his theory of evolution in 1859).

Karl von Rokitansky was born into a century that was ripe for change in many areas. His contribution to advances in medicine, not only in his lifetime but also in the future, cannot be underestimated.

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Correspondence

Fernando Peixoto Ferraz de Campos
Internal Medicine Division - Hospital Universitário - University of São Paulo
Avenida Professor Lineu Prestes, 2565 - São Paulo/SP – Brazil
CEP: 05508-000
Phone: + 55 (11) 3091-9275
E-mail: fpfcampos@gmail.com