

Research Article – History of Anatomy and Embryology

The anatomical knowledge of Joaquín Albarrán (1860-1912)

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Abstract

Joaquín Maria Albarrán (1860-1912) is broadly known as a brilliant mind and a pioneer of modern urology, in spite of his short life. Born in Cuba and being early an orphan, he was sent to Barcelona to study Medicine. Graduate at the age of seventeen, he continued his studies in Paris, where he was trained in surgery and urology, and spent the rest of his life having an extraordinary career as urology surgeon, chief of the Urology Department in Necker Hospital and professor at Paris Faculty of Medicine. Since his first studies, he had been passionate with anatomy, histology, pathology and microbiology and embodied in his books, today considered as classics, a great amount of the special knowledge he had for these fields and the most accurate descriptions of the operative techniques for the urinary tract system.

Key words

Joaquín Maria Albarrán, history of urology, French medicine, urinary tract anatomy, anatomical illustrations, history of medicine.

Joaquín Maria Albarrán life and work

Joaquín Maria Albarrán was born in Villa de la Concepcion de Sagua la Grande, a town in northwest of Cuba, then a Spanish colony on 9 May 1860. He was the fifth child of the physician Pedro Pablo Albarrán and Maria Micaela Domínguez, daughter of a noble family. At the age of four, Joaquín lost both his parents and at the age of nine was sent with his elder brother Pedro to Havana for better education in a Jesuit school. His godfather and tutor, Dr Joaquín Fábregas, a surgeon from Catalonia, sent both the Albarrán brothers to Barcelona in 1872 to continue their studies. Joaquín was a gifted boy and finished high school in 1873, at the age of thirteen and graduated from the Faculty of Medicine in Barcelona University in 1877, at the age of seventeen. The professor of Anatomic Topography and Operations, the surgeon Antonio Morales Pérez, stated that the young Albarrán was his most outstanding disciple (Angulo et al., 2014; Fernández-Arias, 2014). After graduation, he moved to Madrid to follow the necessary courses to obtain the degree of Doctor of Medicine. His thesis, awarded with the Extraordinary Doctorate Prize, dealt with tuberculosis, a disease which would have become the cause of his death (Solis, 1991; Casey and Thornhill, 2006).

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Changing his plans to continue his studies in Germany, Albarrán settled in Paris, a most renowned, cultural, scientific, and artistic Mecca. Upon a contest, he gained a position for an internship in Hospital Hôtel Dieu in 1884 and worked at the clinic, as well as in the laboratories of Louis Pasteur, attracting the attention of Professor Félix Guyon (1831-1920), chief of the Urology Clinic in Necker Hospital who would later consider him the best of his disciples. During the fourth year of his internship he prepared his Doctoral Thesis entitled "*Etude sur le Rein des Urinaires*" and having won an additional year of internship of Paris Hospitals, he chose his teacher Guyon and Necker Hospital. He finally succeeded his Professor at the Chair of Urinary Tract in the University of Paris and Chief of the Urology Clinic in Necker Hospital in 1906. Albarrán was the first surgeon in France to perform perineal prostatectomy for prostate cancer. In 1907, Guyon and Albarrán invited the most eminent European and American urologists to a meeting at Necker Hospital to form an International Society of Urology; once created, its first Congress was held in Paris under the presidency of Albarrán in 1908. His deep histological knowledge, in line with the anatomic French tradition, allowed him to achieve scientific excellence reflected in his books: "*Les Tumeurs de la Vessie*", "*Les Tumeurs du Rein*", "*Exploration des Fonctions Rénales, Etude Medico-Chirurgicale*", "*Anatomie et physiologie pathologique de la rétention de l'urine*" and "*Médecine Opératoire des Voies Urinaires*". His books are currently classics and maintain their validity due exclusively to their anatomical and pathophysiological knowledge and the extraordinary description of the urinary tract operative techniques (Pérez-Albacete, 2012). In the last years of his life he suffered from lung tuberculosis and finally died of this disease on January 17, 1912, at the relatively young age of fifty-two, while in the same year was nominated for the Nobel Prize in Medicine (Casey and Thornhill, 2006). During his short lifetime he received honors from many countries and was greatly recognized as one of the most brilliant minds in the field of Urology. Albarrán was a disciple of Auguste Comte and a believer in positivist philosophy (Jardin, 1996). One of his favorite pleasures (having very short leisure periods) was the reading of the masterpieces of the French literature (Fernández-Arias, 2014.). It is noteworthy that two more famous French physicians, Laennec and Bichat, also passionate with anatomy and histology, died young of the same disease, tuberculosis, which stopped their brilliant careers prematurely (Solis, 1991). A biography written in the 1960s celebrated the centenary of his birth (Paulis Pagés and Monteros-Valdivieso, 1963) and another one (Fernández-Arias, 2012) celebrated the centenary of his death (Fariña, 2013).

The role of anatomy and pathology in Albarrán's career

During his studies at Barcelona Faculty of Medicine, Albarrán excelled particularly in the subjects of anatomy: Dissection and Topographic Anatomy taught by Professors Carlos de Siloniz (1815-1898) and Jaime Ferreras respectively. Taking full advantage of his holidays he preferred to practice anatomical dissection, often going to the famous Corralet at the Santa Cruz Hospital (Solis, 1991). Albarrán continued his special interest for anatomy, histology and pathology after moving to Madrid to obtain a degree as a doctor; he attended a course of Histology, taught by professor Aureliano Maestre de San Juan (1828-1890) who introduced him to one of his students, also very fond of

dissection and microscopic anatomy: the afterwards Nobel laureate Santiago Ramon y Cajal (1852-1934). At the end of the academic year, Albarrán presented his doctoral thesis entitled *The Spread of Phthisis* receiving an outstanding mark and, moreover, the Extraordinary Doctorate Prize "Hors de pair" (Fernández-Arias et al., 2014).

When Albarrán arrived in Paris, besides his Sorbonne medical studies he began attending the Laboratoire d' Histologie with Professor Edouard Brissaud (1852-1909), where he wrote his (unfinished) treatise on testicular tumors. He had there the chance to meet Louis Charles Malassez (1842-1909), anatomist and histologist, a disciple of Claude Bernard (Fernández-Arias et al., 2014.). His permanent attraction to the above fields led him to attend lessons from Professor Louis Antoine Ranvier (1835-1922), whose work he had already studied at the Faculty, at the Histopathology Laboratory at the Sorbonne (Pérez-Albacete, 2012). With professors Malassez and Ranvier he acquired deep physiological, anatomical and histopathological knowledge in addition to that already obtained at the Spanish Universities, preparing for his specialization (Fernández-Arias et al., 2014). It was Ranvier and the most famous Louis Pasteur (1822-1895) who persuaded him to stay in Paris and not return to his native country, as his older brother Pedro, also an urologist, did. Especially Ranvier forecasted the dark professional future at his homeland and encouraged Albarrán to participate to the examinations to enter the city's hospitals as a surgeon (Fernández-Arias et al., 2014). Evidence of Albarrán's respect and admiration for professor Ranvier is the dedication of his French doctoral thesis "*Etude sur le Rein des Urinaires*" to that professor. With the thesis Albarrán won the first prize at the Faculty of Medicine in Paris. In this treatise his broad morphological and histological knowledge is incorporated into urology and anatomoclinical observations are displayed. Ascendant renal infection caused by E-coli and renal changes associated to sepsis were originally described and correlated with autopsy findings (Angulo et al., 2014). Anatomical, histological and microbiological illustrations were depicted as watercolors or watercolors mixed with pencil (mainly figures of macroscopic renal specimens) or ink. The original manuscript of the doctoral thesis has been donated to Asociación Española de Urología (Fernández-Arias et al., 2014). In his book "*Exploration des Fonctions Rénales, Etude Medico-Chirurgicale*", Albarrán analyzed the renal function of each kidney separately after the administration of various substances. His anatomo-pathological training becomes evident in his works "*Les Tumeurs de la Vessie*", and "*Les Tumeurs du Rein*", where he pointed out the histological features of each type of tumor and described the histological classification of several urogenital tumors. In his masterpiece, "*Médecine Opératoire des Voies Urinaires*", he described his technical procedures and his innovations in all the operations he performed. Every surgical operation he experienced is described in detail from the surgical anatomy of the region and the surgical pathways to the organ. Furthermore, he accompanied the text with excellent drawings of anatomical slices (Pérez-Albacete, 2012).

With his excellent background in histology and pathology, his name is eponymous with the description of the minute submucosal glands in the sub-cervical region of the prostate gland that empty for the most part into the posterior part of the urethra (*Albarrán's glands*) and his description of inflammatory retroperitoneal fibrosis of unknown etiology resulting in ureteric obstruction (*Albarrán-Ormond syndrome*) (Enersen, 2014). John Kelso Ormond (1886-1978) was an American urologist at Detroit Hospital who is credited with the first detailed description of idiopathic retroperitoneal fibrosis in

the English literature in 1978, but Albarrán first described it in 1905 (Fairweather and Jawad, 2014). Furthermore, his name was also given to “*Albarrán’s sign*”: it is a ureteric hemorrhage seen when fluid is injected into the renal pelvis to distend it, suggesting the presence of a renal pelvic cancer (Wong Corrales and Rodríguez Álvarez, 2011).

Albarrán was also passionate with surgical instrumentation, inventing all along his career new models or perfecting them; all were manufactured by the French company Collin. The most significant among the instruments he designed was undoubtedly the *Albarrán lever*, which would allow ureteral catheterization through the natural way. Albarrán had an inspiration while sleeping and designed it after awaking at night; the next day applied to Collin Company to have his idea realized. It was an ingenious system having an additional wheel at the ocular end of the cystoscope, whose movement would be transmitted to a lever; through maneuvering the wheel it was possible to precisely change the probe’s direction, guiding it towards the ureteral orifice, and safely inserting it in the tract. The instrument, later known as *Albarrán lever*, was presented to the Paris Faculty and to the 12th International Medical Congress in Moscow in 1897 (Fernández-Arias et al., 2014).

Conclusion

Albarrán built his early training on basic sciences such as anatomy, physiology and histology and deeply understood them as one and inseparable entity. His specialty, urology, made tremendous progress towards the end of the 19th century by the knowledge of anatomy and physiology of the urinary system, while new techniques (endoscopy and imaging) contributed to major innovations. During his fabulous career he returned many times to research and to the study of pathology of the genito-urinary tract, applying essential knowledge to the daily clinical practice at the hospital. Indeed, he approached anatomical structure and physiological function of every urinary organ. He made a special contribution to anatomy by the knowledge of the muscular sphincters of bulbar urethra, the morphology of the glandular tubules of the prostatic urethra which have been named after him and the relationships of the prostatic capsule which are critical for the region surgery. Training in urology demanded extended knowledge of anatomy and physiology as a basis to understand anomalies and pathologies and to design surgical procedures.

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