

Biography of Salvador Gil Vernet, eminent urologist anatomist (1892-1987)

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Abstract: Salvador Gil Vernet 1892-1987 was a pioneering surgeon scientist who made many innovations and surgeries. His approach was quite revolutionary at the time. He stated that it was not sufficient to describe an anatomical structure. He said that an answer was required to the question of “*what is it for*”. “*Precise, almost mathematical knowledge of anatomy is a highly fertile source of surgical applications, suggesting new techniques and helping perfect and simplify existing surgical methods, making them less mutilating and more benign and, in short, raising surgery to the rank of true science.*” His innovations were many and varied. He invented a new sacral epidural anesthesia technique to be applied in prostatic surgery. In 1919, in cooperation with Dr. F. Gallart, he described, for the first time in the human being, the lower mesenteric ganglion. In 1926 he published “*El Sistema Nervioso Órgano-vegetativo. Contribución a su estudio anatómico y embriológico*” where he tried to unravel how anastomoses are formed between the various ganglionic areas during embryonic development. At the end of the 1920s, Gil Vernet’s research was centered on the study of the topographic anatomy of the male pelvis and perineum, with a specific focus on the bladder, the neural pelvic plexus and the prostate. In 1944 in the volume “*Cáncer de Próstata*”, which is considered the most outstanding Spanish contribution to studies in urology, highlights the importance of diet, race and, genetics in the development of prostate cancer and showing that malignant neoplasms usually originates in the prostate gland itself and not in areas of benign prostate hyperplasia. One important contribution was the discovery of the “*precervical arc of Gil Vernet*” which many years later provided the key to the mechanism of how the female urethra is closed by the 3 directional forces discovered by Petros & Ulmsten in their pioneering work on the midurethral sling.

Keywords: Historical; Anatomy; Urology.

Salvador Gil Vernet was born in the small town of Vandellós province of Tarragona (Spain) on August 10th, 1892. During his childhood, he showed great passion for the natural sciences and showed a great enthusiasm for botany, which he practiced during his summer holidays. In 1903, Josep Musté, a medical doctor, formerly in Vandellós, wrote in a letter to Salvador’s parents. “*I was duly informed about young Salvador’s outstanding performance at school. It does not surprise me at all, since many years ago I had predicted that the kid, properly supervised, would eventually become renowned*”.

In 1909, at the end of his high school years, he moved to Barcelona and entered the School of Medicine of the University of Barcelona, from where he graduated with outstanding grades on June 30th, 1915. During his university years, he worked as an anatomy assistant in the Anatomy Department (Fig. 1). In 1918 he submitted his doctoral thesis and was temporarily appointed to an assistant professorship in the Anatomy Department which was at the time directed by Prof. Emili Sacanella (1860-1931). He married Mercedes Vila Sanromá in 1920 (Fig. 2), and had two children, Salvador (1921-1965) and José María (b. 1922); both would become urologists. The same year, he failed in his first competitive exams to become a Professor of Anatomy in Madrid. Prof. Santiago Ramón y Cajal, president of the board of examiners, did not give his vote for Salvador or anyone else, claiming that “*In my opinion, there are no appropriate candidates sitting these exams because some of them are too old to start working as scientific researchers and the others do not have enough experience, as they are too young*». Thus, the position remained vacant.

In 1926 he successfully became a Professor in the Anatomy department at the Universidad de Salamanca, where he asked for an extended leave of absence to pursue his professional interests in Barcelona. He obtained the position two years later, and was transferred to Barcelona. On July 4th, 1928 he officially took over the Anatomy department at the Universitat de Barcelona also performing functions as Director of the Professional School of Urology at the Hospital Clinic of Barcelona.

A few weeks after the outbreak of the Spanish Civil War, on August 19th, 1936, due to his conservative ideas, he was dismissed by the Government of the Spanish II Republic and along with other professors of the Universitat de Barcelona, was relieved of all responsibilities. Persecuted by commu-



Figure 1. – Salvador Gil Vernet (right) with his students in a practical class of Anatomy at the old Santa Creu Hospital (1918).

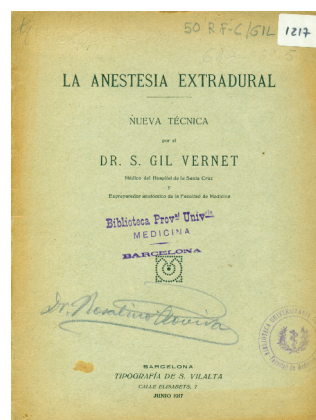


Figure 2. – The first description of a sacral epidural anesthesia (1917).

nists and anarchists, he decided to live in exile. Years later he would remember, «When, on the evening of August 14th, 1936, from the French ship Cortes II, I thought I was saying, 'Goodbye, forever!' to my country, I experienced emotions hitherto unknown. Suddenly, I had lost everything that a man can lose, save only honor and life, and these had been saved thanks only to the charity of the diplomats of Nicaragua and France». He lived first in Toulouse, France, and then in Italy, where he took part in the foundation of the Mediterranean Urology Association. He eventually returned to Barcelona in 1939, once again joining the Anatomy department.

In his double professional role as anatomist and urologist, Gil Vernet often noted his findings in the dissection room, and the operating theatre were uncorrelated to the descriptions in the classical topographic anatomy treatises published in the mid-nineteenth century. These contradictions prompted him to an exhaustive and careful study of male urogenital anatomy and his projection in the genitourinary physiology, which extended over more than forty years. During his long scientific career, Gil Vernet delved into his studies with great discipline and effort. As he used to say: “*Scientific inspiration does not exist if not accompanied by cerebral sweating*”. His findings were crucial also to comprehending the anatomy and pathological processes of the prostate and to designing less invasive new surgical techniques for radical perineal prostatectomy.

Thanks to his vast, daunting work during the 1950s and 1960s, the Urological Department of Prof. Gil Vernet would become one of the most prestigious urologic institutes in the world, a venue hosting urologists such as Prof. Adolphe Steg (France), Prof. Ian Thompson (USA), Prof. Ermanno Mingazzini (Italy) or Prof. Willy Gregoir (Belgium) among many others (Fig. 3). As a result of the department’s great international projection, Gil Vernet maintained fruitful exchanges with the Nobel Prize Prof. Charles B. Huggins through frequent correspondence (Fig. 4) and was invited as Lecturer to the University of Chicago.

Salvador Gil Vernet retired from his professional activity when he was 75 and dedicated his last years to the cultivation of roses and lemon trees in his house by the sea in Castelldefels (Barcelona). He passed away in Barcelona on October 24th, 1987 and was buried in Vandellós.

AWARDS

In 1948, he became a full member of the Royal Academy of Medicine and Surgery of Barcelona. In 1965, he received the “Pedro Virgili” National Surgery Prize and the



Figure 3. – Salvador Gil Vernet and Mercedes Vila wedding day (1920).



Figure 4. – Salvador Gil Vernet (right) with Prof. Willy Gregoir. In the Assembly Hall of the Barcelona Faculty of Medicine, during the 1st International Urology Course (1962).

“Antoine Portal” Prize of the National Medicine Academy of France. He was elected President of the Société Internationale d’Urologie between 1967 and 1973. In 1967, he was appointed Honorary Chairman of the Spanish Urological Association, and in 1977 he was appointed Honorary Professor of the Royal National Academy of Medicine of Spain. He was also granted the distinctions of Knight of the Legion of Honour of France and Doctor Honoris Causa by the University of Toulouse (Fig. 5). Recognition also came in the form of being named an Honorary Member of the Urology Associations of France, Italy, Greece, Mexico and Colombia, and was a guest lecturer at the Universities of Chicago, Columbia, the Autonomous University of Mexico, Buenos Aires, Bogotá, Toulouse, Tokyo, Amsterdam, Johannesburg and Munich. In 1986, he received, alongside his son, José María Gil-Vernet Vila, the “Narcís Monturiol Prize” awarded by the Government of Catalonia.

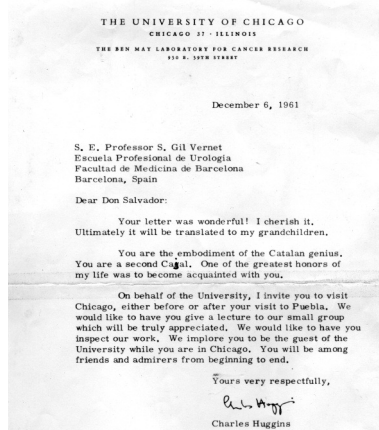


Figure 5. – Letter from Prof. Charles B. Huggins inviting Salvador Gil Vernet for a lecture at the University of Chicago (1961).

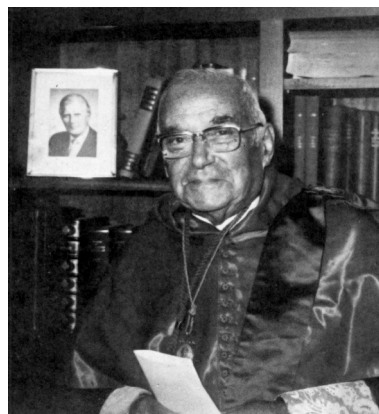


Figure 6. – Salvador Gil Vernet *Doctor Honoris Causa* by the University of Toulouse (France) ca. 1960.

SCIENTIFIC WORK

In 1917, based on his work on his studies of pelvic anatomy and in collaboration with Dr. F. Margarit, director of the Department of Anatomy at Hospital de la Santa Creu, described a new sacral epidural anesthesia technique to be applied in prostatic surgery (fig. 6). In 1919, in cooperation with Dr. F. Gallart described for the first time in the human being, the lower mesenteric ganglion¹. In 1926 he published "El Sistema Nervioso Órgano-vegetativo. Contribución a su estudio anatómico y embriológico"² where he tried to unravel how anastomoses are formed between the various ganglionic areas during embryonic development. Faced with the enormous complexity of this endeavor, he sought advice from Santiago Ramón y Cajal, whom he had met in 1920 as chairman of the Opposition Committee for the chair of Anatomy. From then on, the men maintained correspondence (Fig. 7).

At the end of the 1920s, Gil Vernet's research was centered on the study of the topographic anatomy of the male pelvis and perineum, with a specific focus on the bladder, the neural pelvic plexus and the prostate. Following in the steps of German morphologist Hermann Braus, Salvador Gil Vernet considered that it is not enough to determine the "what" and the "how" of an anatomical structure, an answer is needed to the question "what for". This way he strived to develop a functional urogenital anatomy, which better-allowed doctors to understand and explain the physiology of urination, erection and, ejaculation. Likewise, Gil Vernet provided new insights into the topographic anatomy of these structures, building bridges with surgery and helping to develop more precise and scientific surgical techniques³.

Gil Vernet was an untiring worker in a country, Spain, which after its devastating Civil War was a wasteland for scientific research. Thanks to his effort and perseverance he was able to compensate for the economic hardships of the 1940s and published four books dedicated to the study of urogenital anatomy and pathology as well as over 50 journal publications between 1917 and 1977. Possibly his chief work was "Patología Urogenital"(Urogenital Pathology) , a three-volume work composed by "Cancer de Próstata" (Prostate Cancer)⁴, "Biología y Patología de la Próstata" (Biology and Pathology of the Prostate)⁵ and "Enfermedades de la Próstata" (Diseases of the Prostate)⁶ focused on the study of the prostate, its embryology, topographic anatomy, pathology and surgical techniques and "Morphology and Function of Vesico-Prostato-Urethral Musculature"⁷ a work dedicated to the study of the topographic and microscopic anatomy of the detrusor, trigone, vesical neck,

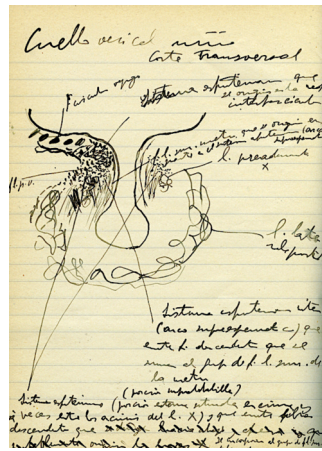


Figure 8. – Salvador Gil Vernet's field notebook.

posterior urethra, urogenital striated musculature and the vesicourethral musculature in woman.

In 1930 he started to apply the histotopographic method, a technique of anatomical study (whole-mount sections) in the uro-anatomy laboratory, which had been described by the German anatomist Otto Kalischer thirty years earlier⁸. With the help of the giant Sartorius-Werke microtome, he obtained frozen sections of the pelvic visceral block from fetal and adult specimens. About 200 preparations were collected from each specimen, with a thickness of 20 to 50 microns and measuring 12 to 9 centimeters. Microscopic observation at a magnification of 10x and 100x allowed microscopic dissection of muscle and nerve elements which would otherwise be invisible in the macroscopic examination.

Gil Vernet annotated the most interesting details in his field notebooks (Fig. 8), which would later be drawn in pencil and Indian ink by the second year students at a scale of 1:7 to 1:15. (Fig. 9) The incredible richness in the details in the drawings of the histotopographical sections was praised by Charles B. Huggins who wrote: "Let the young surgeon study sagittal sections of the pelvis of the human male, for example, the beautiful studies of Gil Vernet"⁹. Since 2005, a large number of drawings have been collected and restored, amounting to a total of 604 items, which now comprise the *Salvador Gil Vernet Collection of Urology Drawings*¹⁰.

In 1944 in the volume "Cáncer de Próstata", which is considered the most outstanding spanish contribution to studies in urology, highlights the importance of diet, race and, genetics in the development of prostate cancer and showing that malignant neoplasms usually originates in the prostate gland itself and not in areas of benign prostate hy-

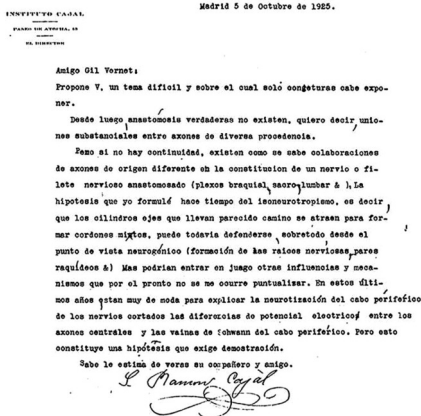


Figure 7. – Letter from Don Santiago Ramón y Cajal to Salvador Gil Vernet (1925).

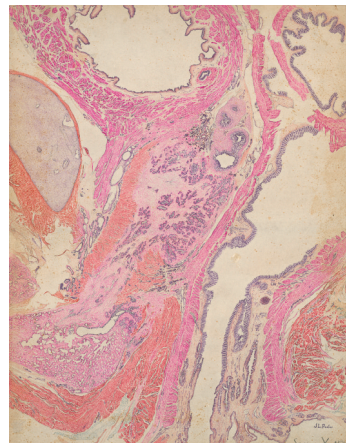


Figure 9. – Drawing from a sagittal histotopographic section. New-born pelvis and perineum. H&E stain. Indian ink on paper, 64 x 50 cm. Artist: L. Roca, 1940.

perplasia. The chapter entitled “Anatomía Quirúrgica Prostatoperineal” describes the external urethral sphincter, for the first time in the twentieth century, as a tubular structure, vertically arranged and consisting of two layers, i.e. an internal layer formed of circularly – and longitudinally – arranged smooth muscle and an external layer of circular striated fibres which were divided into three areas: cranial, medial and caudal. He refuted the existence of a plate of muscle arranged transversely between the two ischiopubic rami, an error that was established in atlases and anatomy textbooks until the end of the 20th century. He also demonstrated that the deep transverse muscle of the perineum does not exist and that the structures surrounding the bulbourethral glands are the dorsocaudal fibers of the external urethral sphincter. Also in this chapter, he shows that the vertical extension of the pelvic nervous plexus follows the posterolateral border of the prostate, forming, together with the accompanying vessels, the prostate neurovascular bundles. He also described a ventral prolongation of the pelvic plexus that forms the anterolateral and anteromedial vascular pedicles. He wrote: *At every one of the four corners of the rectangle that makes up the prostatic cell, a neurovascular bundle is observed, and those are the bundles which carry the vessels and nerves intended for innervation and irrigation of the prostate, membranous urethra and the cavernous nerves, enabling erection*”.

In “Biología y Patología de la Próstata” describes the first regional anatomical model of the prostate gland. He clearly demonstrated that the prostate is not a homogeneous gland and that it consists of three regions: the cranial, the caudal and the intermediate glands. He wrote: *“...accepting the principle of duality of the prostate gland as valid, we believe that a detailed analysis of these complex problems will not unequivocally support the final division between the cranial gland and the caudal gland. It is necessary to insert a portion between both poles, which we shall call the intermediate gland, establishing a smooth transition between the cranial and caudal portions”*.

This model was urethrocentric, with areas defined according to the location of their collecting ducts opening into the urethra and was later used by McNeal, with minimal variations, as the foundation of his zonal anatomy model.

Gil Vernet observed that benign hyperplasia develops in the cranial gland and that carcinoma develops in the caudal gland. Prof. Charles B. Huggins cited this major work: *“The Gil Vernet Phenomenon wherein the human prostate is separated into two physiologically and oncologically different divisions, is of permanent value. It is a wonderful discovery”*.

Also in this volume, he described a group of dorsal longitudinal smooth musculature which he called the posterior prostatourethral muscular bundle, and which forms the relief of the mucosal fold in the infracollicular urethra known as *christa urethralis*. This muscular bundle originates below the ejaculatory ducts at the lower pole of the colliculus seminalis and runs dorsally and downwards ending into the penile bulb. The function of this muscle is to shorten and dilate the infracollicular urethra during ejaculation.

In “Biología y Patología de la Próstata” and in “Morphology and Function of Vesico-Prostato-Urethral Musculature” he studied the musculature of the bladder with the aim to determine the role of the different bundles of the detrusor and their relationship with the bladder neck and the prostate

in urination and urinary continence. He observed that the pubovesical or puboprostatic ligaments are not really ligaments but fibers of the anterior longitudinal muscle layer of the detrusor covered by the endopelvic fascia, which run downwards and frontwards, running over the prostate and inserting into the pubis.

Gil Vernet was the first to describe the “transverse precervical arc”, a triangular structure formed by the intersection of the outer, anterior and posterior longitudinal fibers of the detrusor in the caudal part of the bladder’s anterior surface. The central part of this muscular triangle is mainly occupied by fibers with a vertical direction that come from the anterior wall of the detrusor. This muscular complex was called the “vesico-urethral retrosymphysial system.”

In 1953 Gil Vernet described the posterior longitudinal fascia of the detrusor or the detrusor’s posterior longitudinal bundle, which descends uninterruptedly from the urachus, running caudally between the ureters and covering the trigone and the dorsal wall of the internal vesical sphincter. Several medial bundles penetrate deep into the prostate, tapering, to end near the opening of the ejaculatory ducts at the colliculus seminalis. This bundle was described by Eduard Uhlenhuth¹¹ in the same year, although this author does not describe its caudal extension, which crosses the prostate.

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