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## REVIEW

## History of splenectomy

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## ABSTRACT

**Background:** The spleen has been considered for millennia a fascinating and mysterious organ with multiple functions. The spleen has long been an organ of interest in popular as well as medical literature.**Methods:** A literature (PubMed) and historical review about splenectomy has been performed.**Results:** The importance of spleen and the related surgical procedure of splenectomy has been an important topic of scientific interest since the Ancient Greece culture to more modern times.**Conclusions:** Spleen and splenectomy have important roles in the medical literature and popular tradition. Nowadays laparoscopic splenectomy is increasingly popular and for certain indications it is considered the gold standard therapy.

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For millennia, the spleen has been considered a fascinating and mysterious organ with more functions than any other organ. It has long been an organ of interest in popular as well as medical literature. According to Plato,<sup>1</sup> the spleen was created in order “to maintain the liver bright and pure”. In 1600, Malpighi in the *De liene*<sup>2</sup> reports: “I do not know because the *Dotta Antiquità* said that the spleen is expression of laugh, but, the nature of this viscus is unknown”; and he continues to propose the idea that the spleen favors joviality. In ancient Greece, Hippocrates,<sup>3–5</sup> in his *Aphorisms*, described with remarkable accuracy the anatomy of the spleen, recognizing also its indispensable role in life since it produces the “black bile”, one of four vital humors. Six hundred years later, Celsus<sup>6</sup> still refers to “a completely unknown organ, whose task is to pour melancholy humors of the blood through the splenogastric vessels”. However, there were some who considered the spleen a simple counterbalance, “to balance the left part of the body with the right one”, but many considered it “a useless Organ, to be eliminated!”.<sup>7</sup>

The spleen had long been associated with the ability to run, with references in ancient literature to splenectomy being performed to allow men and horses to run faster; as Pliny asserts<sup>8</sup>: “The Viscus has the characteristic of slowing down the race of men, for this reason, runners were subordinated to its burn with a red-hot iron”. In 1922 this myth was tested in the laboratory at Johns Hopkins University, where Macht and Finesilver observed that asplenic mice were able to run faster than mice with an intact spleen.<sup>9</sup>

Aulus Cornelius Celsus, in *De re medica*,<sup>6</sup> gave a precise clinical description of hemorrhagic shock from splenic trauma and the signs of peritoneal and diaphragmatic irritation: “At liene icto sanguis niger a sinistra parte prorumpit; praecordia cum ventriculo ab eadem parte indurescunt; sitis ingens oritur; dolor ad iugulum sicut iocinere vulnerato venit”. In the 14th century, in the *Codice*

*Bolognese*, Mondino De Liucci<sup>10</sup> described with remarkable precision the splenic vascularization: “The section of lienal vein is divided in two branches, of which one comes to nourish the left superior part of the stomach (short vessels), the other goes to the rest of the stomach (gastroepiploic vein)”.

Malpighi<sup>2</sup> in *De liene* accurately gives news of his discoveries, reporting on the “splenic cap” never described by anybody before and of the trabeculae “that accompany the distributions of vessels, collected in bundle to tube shape”. He also identified the splenic follicles that have been named after him and, through ingenious injections of china ink into the vasal lumen, he described the exact organization of the arterial and venous system. This is one of the most accurate anatomical studies that we found before 1650.

Fioravanti reports that splenectomy was performed in Italy in 1549 by the old Neapolitan surgeon Adriano Zaccaria in a 24-year-old lady with malarial splenomegaly: “The spleen weighed 1340 grams; the recovery was 24 days”.<sup>11,12</sup>

In the sixteenth century, Paracelsus wrote that the spleen was a superfluous organ that should be excised when diseased. Vesalius excised the spleens of many animals without adverse effects, supporting his contention that the spleen was not essential to life.<sup>7</sup>

The first description of a traumatic hernia of the spleen is attributed to Ambroise Paré de Laval,<sup>13</sup> but a systematic study of this topic was carried out three centuries later, in 1876, by Otis, who reported 16 cases from the American War of Rebellion.<sup>14</sup>

In 1893, Jaboulay proposed “*exosplenopexy*”, i.e. partially extracting the spleen and suturing it to the edges of the external wound. Therefore the wound of the left hypochondrium with the hernia of the spleen was treated by the more audacious surgeons of the time outside, by tamponing with gauzes in order to control hemorrhage: the organ’s external part atrophied spontaneously.<sup>7,11,12</sup> Pallavecchio

coined the term “*Exosplenolisi*” to define partial extraction with thermocautery-provoked destruction of the external part of the organ, without waiting for spontaneous atrophy.<sup>7,11,12</sup>

The first splenectomy for a tumorous spleen was performed by Quittembaum in 1826: “an organ of 6 libra of weight in an ascitic woman of 22 years”. The patient died in the immediate post-operative period. Franzolini, in Italy, reported in 1881: “I extirpated the organ in a woman of 22 years with aplastic anemia, and the medical examination, practised many months after, showed a normal relationship between leucocytes and red corpuscles”.<sup>7,11,12</sup>

Between 1905 and 1926, Lord Berkeley Moynihan, who would be president of the Royal College of Surgeons of England from 1926 to 1930, published four editions of his book *Abdominal operations*, defining medical indications for splenectomy that ranged from leukemia to Hodgkin’s disease, from pernicious anemia to Gaucher’s disease.

Conservative therapy was born during surgery of war; the first successful partial splenectomy for trauma was reported by Franciscus Rosetti in 1590.

In 1914 Barnes was the first to review and compare different surgical therapies: 3 deaths in 30 conservative operations, that is 10%, as opposed to 35 deaths in 80 splenectomies for trauma, that is 43.75%; however, no information is provided about the nature of the splenic lesions.

Mayo in 1910 described cases of splenorrhaphy. In 1911, Kocher – an authority in the field – stated: “Injuries of the spleen demand excision of the gland. No evil effects follow its removal, while the danger of hemorrhage is effectually stopped.” Therefore from then on everybody believed in splenectomy for every indication, whether urgency, necessity, or choice, until in 1952 a piece of news alarmed everyone: King and Shumacker<sup>15</sup> reported five cases of fulminating sepsis among one hundred splenectomized children; they emphasized the fact that the condition of aspleny, resulting from surgical removal, causes a higher susceptibility to bacterial sepsis, from fulminating course to elevated mortality.

With improvements in anesthesia, surgical techniques, hematology and oncology the mortality and morbidity have decreased.<sup>16</sup> Recently, laparoscopic resection and partial resection of the spleen have become fairly commonplace. The technique was first described in 1992, and has become a well-accepted procedure. In fact, at the

present time, laparoscopic splenectomy is the “gold standard” for the surgical treatment of immune thrombocytopenia purpura.<sup>17–19</sup>

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The authors have no conflicts of interest to declare.

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