



Historical Note

Jean Fernel (1497-1558). Contribution to the understanding of aortic aneurysms in his work *Universa Medicina*

Jean Fernel (1497-1558). Aportación al conocimiento de los aneurismas de aorta en su obra Universa Medicina

Carlos Esteban Gracia

Department of Angiology, Vascular and Endovascular Surgery. Hospital Universitari Germans Trias i Pujol. Badalona. Barcelona, Spain

INTRODUCTION

A good definition of Jean Fernel (Fig. 1) would be to consider him a Renaissance scholar or perhaps a humanist. He was born in Montdidier in 1497, a town located north of Paris (France), where he later moved to pursue his academic training. He studied philosophy, astronomy, mathematics, and medicine. He authored works on all these subjects and was also a professor of Medicine at La Sorbonne.

His contribution to the description of aneurysms has been cited as occurring in 1542, when his first medical work, *De naturali parte medicinae. Libri septem*, was published. This is not entirely accurate, as that would make him the first to do so. In fact, he addressed aneurysms in his major work *Medicina*, published in 1554 (Fig. 2). Even then, he did not provide a detailed description as Antoine Saporta did in the same year, nor as Andreas Vesalius would do a year later; rather, he simply mentioned the existence of aneurysms in different parts of the body.

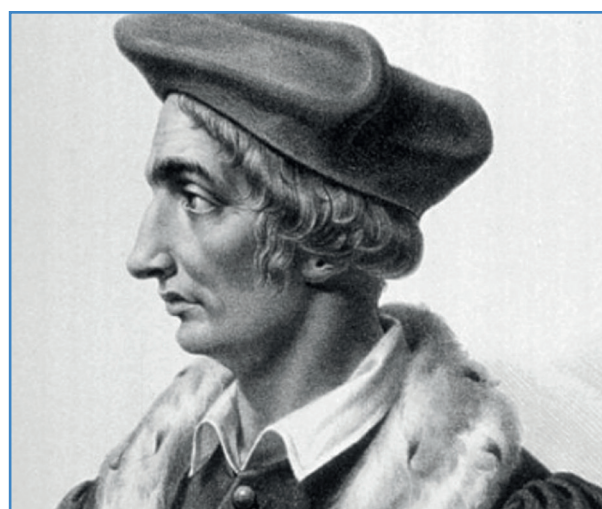


Figure 1. Jean Fernel's portrait (1497-1558).

Nevertheless, several contributions relevant to vascular pathology should be attributed to him. He distinguished between true aneurysms and false aneurysms and was also the first to relate cardiac systole to an increase in arterial diameter.

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Correspondence:

Carlos Esteban Gracia. Department of Angiology, Vascular and Endovascular Surgery. Hospital Universitari Germans Trias i Pujol. Carretera de Canyet, s/n. 08916 Badalona. Barcelona, Spain
e-mail: carlosestebangracia@gmail.com

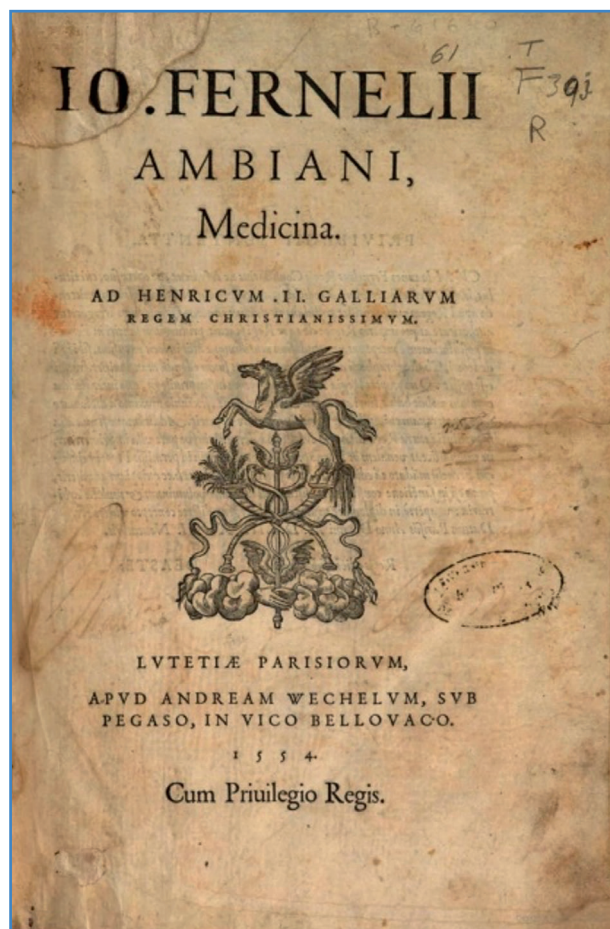


Figure 2. *Medicina's cover (1554).*

In 1542, he introduced the term physiology in *De naturali parte medicinae*, and in 1554, he introduced the term pathology in *Medicina*, where he systematically described all known diseases of the 16th century by organ systems. This book achieved immediate success, granting him great prestige; it had multiple editions (more than 30 over more than 200 years) and led to his appointment as physician to King Henry II of France. In fact, in 1555, the second part of the book, *Pathology*, was published as a separate text. It was translated into English in 1591 and into French in 1650.

Although Fernel's physiology was Galenic—based on the balance of humors and elements—he believed that anatomically the body was composed of fibers, which he obviously could not see, forming its structural support. He stated that “anatomy is to physiology what geography is to history, the stage where events unfold,” thus establishing the concept of physiology as it is understood today.

OBJECTIVE

The objective of this work is to analyze and clarify the contributions of Jean Fernel to the understanding of aortic aneurysms.

Universa Medicina (1554)

The book is divided into three parts: *Physiologiae*, *Pathologia*, and *Therapeutices*. For the analysis and review of the text, the first edition of the work from 1554 was used, as well as the second French edition of the second part, *Pathology*, published in 1660.

In Book V of *Pathology*¹, “De partium morbis et sintomatibus” (“On diseases and symptoms of organs”), Chapter 12 addresses heart conditions. It states:

Excessive palpitation of the heart is a strong agitation during diastole and systole, causing discomfort. It is so intense that the ribs near the thorax have often been observed to move. Frequently, the parts located over the chest have also been displaced from their original position; occasionally, an artery has even been seen to dilate outward in the form of an aneurysm the size of a fist, in which pulsation could be perceived both by touch and by sight. Thus, in this cardiac condition, all arteries are violently agitated and sometimes dilated, especially those in the neck. At times, this symptom appears intermittently at rest but worsens considerably with excessive exercise, heat, baths, sexual activity, intoxication, wine consumption, and drops in temperature.

Of note, as mentioned, that Fernel's pathology is Galenic, based on humoral imbalance, and that systemic circulation had not yet been described; therefore, the true function of arteries was unknown. The description appears to correspond to an aneurysm of the ascending or thoracoabdominal aorta, based on the location described and its exacerbation under conditions that increase heart rate. It was likely a syphilitic aneurysm, considering the historical context and location. He continues:

The ancients attributed the cause entirely to an excess of blood or to infiltration of abun-

dant humors into the pericardium. However, in carefully examined cases, palpitation revealed the presence of thick bile, which under other circumstances would be naturally evacuated into the arteries. In two individuals who died suddenly during intense exercise, this bile was found to have solidified into black, tophus-like masses. In other cases, bile was observed to infiltrate the viscera, often accumulating in the spleen. For this reason, those most prone to this symptom are individuals suffering from hypochondriacal melancholy and those whose spleen is overloaded with yellow bile. In such individuals, palpitation is notably perceived in the spleen and pancreas. Hence, this artery is saturated with humors, and the harmful effect of irritation depends on arterial pulsation, whose defect must be eliminated.

He clearly attributes these phenomena to an accumulation of bile within the vessels, suggesting an attempt to explain aneurysm formation. Fernel practiced autopsies, so he likely observed dissected, fissured, or ruptured aneurysms, and his description may correspond to blood infiltration into abdominal tissues or perhaps to the fibrous thrombus found within aneurysms, interpreted as bile accumulation. He believed in a clear correlation between symptoms and postmortem findings.

In Book VII of the pathology, *"De externis corporis affectibus"* ("Affections of the external parts of the body"), Chapter 3 is entitled *"Tumores, tubercula atque pustula ex pituita,"* which we translate as "Swellings, tubercles, and pustules caused by phlegm" (by *pituita* was meant a viscous, watery humor secreted by certain organs, especially the nose and bronchi). Here we find the best-known description in the literature of aneurysms as presented by Jean Fernel. In this chapter, he discusses the differential diagnosis of various types of swellings, such as edema, lymph nodes, tumors, abscesses, etc., and describes the clinical differences among them. He also addresses cutaneous lesions, which may ulcerate, and then goes on to describe the following:

Varices and aneurysms belong to this group due to the similarity of their causes. Varices are excessive dilatations, more common in the legs

than in other parts of the body. The vein is filled with thick, coarse blood; the area appears livid or black and swollen, but painless. The swelling yields immediately to finger pressure and quickly returns. It may be caused by trauma, contusion, excessive effort, work, or travel; sometimes it is engorged, as in pregnant women.

An aneurysm is a dilation of an artery formed when it is filled with "spirituous" blood. It may occur in external parts such as the hands, feet, around the throat, and chest. It differs from varicose veins in that it is accompanied by strong pulsation, turgidity, and often pain. When pressure is applied, the internal content escapes easily. It may also occur in internal arteries, especially beneath the chest, around the spleen and mesentery, where violent pulsation is often noted. It is scarcely credible that a vein or artery ruptures and opens due to these conditions, as some imagine, because if blood were no longer contained, it would quickly corrupt and putrefy, forming a different type of tumor.

He provides a description similar to that in Book V and discusses the difference between varicose veins and aneurysms, noting that both are swellings that can be distinguished by their clinical presentation and physical examination findings.

DISCUSSION

Although it is reported in the literature that Jean Fernel may have described aortic and other aneurysms as early as 1542 (2), I believe this statement is not entirely accurate. In 1542, he published *De naturali parte medicinae*, in which he explains the concept of physiology, forming the first part of his work *Medicina*. It was in 1554 that he published *Medicina*, where we can indeed consider that he discusses aneurysms and infer that he refers to aortic aneurysms in the second part of the work, *"Pathologia."*

To correctly interpret this text, it is important to remember that Fernel was a Galenist; that is, his physiology was based on the theory of humors and his pathology on their imbalance. It was not until 1628 that *Exercitatio anatomica de motu cordis et sanguinis in*

animalibus was published by William Harvey, so more than 70 years still remained before the discovery of the systemic circulation, and many more before his theories were widely accepted.

In the text, Fernel clearly distinguishes between arteries and veins, stating that both undergo dilations due to similar causes but exhibit different clinical behavior. He concludes that if they were to rupture and blood were to escape, it would then constitute a different disease.

He explains that an aneurysm is a dilation of an artery formed because it becomes filled with “spirituous” blood, and he then describes the most common locations: “External parts, hands and feet, around the throat and chest [...]. Sometimes it occurs in internal arteries, especially beneath the chest, around the spleen and the mesentery, where a violent pulsation is often noted.” From this, we can infer that he is referring, on the one hand, to peripheral aneurysms—probably post-traumatic—and, on the other, to true aneurysms, likely syphilitic in origin. However, it cannot be stated that he clearly distinguished between true aneurysms and pseudoaneurysms, as some authors

have suggested, although he does clearly state that aneurysms are dilatations of the arteries, implying involvement of all their layers.

CONCLUSIONS

It seems obvious that, although Fernel did not fully explain their function, he clearly distinguished between two types of vascular swellings (varicose veins and aneurysms), was familiar with the symptoms of thoracoabdominal and peripheral aortic aneurysms, and likely performed autopsies on patients with aortic aneurysms—probably syphilitic—that had dissected or possibly ruptured.

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