

The “Angle of Louis”

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SUMMARY

The 'angle of Louis' is a well-known anatomical landmark. Formed by the junction between the manubrium and sternal body, it marks the level of the 2nd rib and defines the boundary between the superior and inferior mediastinum. Despite our familiarity with this angle, there remains confusion over the eponym. This is reflected by the variations of the name in the literature - Louis, Ludovici, Ludovicus, Ludwick and Ludwig - and the different people it has been attributed to. Sources have referenced the French clinician Antoine Louis, the French surgeon Alexandre Louis and the German physician Wilhelm Friedrich von Ludwig. Interestingly on investigating these potential candidates we found no formal description of the sternal angle in their writings. Pierre Alexandre comes closest however, when he describes a 'prominence' in the upper part of the chest which he relates to severe emphysema. We propose that the sternal angle was named in honour of Pierre Alexandre, although he did not himself characterise it as an anatomical landmark.

Key words: Angle of Louis – Medical Eponyms – Origin – Etymology – Anatomical landmark – Historical

INTRODUCTION

The 'angle of Louis' is a well-known anatomical landmark. Formed by the junction between the manubrium and sternal body, it marks the level of the 2nd rib and defines the boundary

between the superior and inferior mediastinum. Despite its common usage over the last 160 years, there remains confusion over the origin of the eponym (Goodman, 1910). This is reflected by the variations of the name in the literature - Louis, Ludovici, Ludovicus, Ludwick and Ludwig - and the different people it has been attributed to. Sources have referenced the French clinician Antoine Louis, the French surgeon Pierre Alexandre Louis, and the German physician Wilhelm Friedrich von Ludwig. Here we review the background of these three individuals and investigate the opposing evidence for their accreditation with the so called 'angle of Louis'.

The candidates

Antoine Louis (1723-1792)

Born in Metz, Antoine Louis received his preliminary medical training from his father, a surgeon-major at the local military hospital. As a young adult he went on to work at the Salpêtrière. On completing his service in 1749 he presented in Latin his thesis on the transmission of malaria. This was seen as a defiant statement that surgeons were as educated as their physician colleagues. The following year Antoine was appointed Professor of Physiology. In 1764 he was made lifetime secretary to the Académie Royale de Chirurgie. Late in his life Antoine Louis designed a more humane execution system in conjunction with Joseph Ignace Guillotin. Although this device now bears the name of his co-inventor, it was originally called a *louisette*.

Pierre Alexandre Louis (1787-1872)

Pierre Alexandre Louis grew up in Champagne at the time of the French revolution. He

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Fig. 1. Antoine Louis (February 13, 1723 – May 20, 1792).



Fig. 2. Pierre Alexandre Louis (April 14, 1787 – August 22, 1872).



Fig. 3. Wilhelm Friedrich Von Ludwig (September 16, 1790 – December 14, 1865).

initially studied law, but then at the age of 20 changed to medicine. After graduating in 1813, Pierre Alexandre toured Russia for three years before setting up his medical practice in the Ukrainian city of Odessa. Whilst there, he received the honorary title of physician to the Czar. In 1822, after witnessing a diphtheria epidemic that killed thousands of Russian children, Pierre returned to Paris to study the disease. With his subsequent research (based on case histories and autopsies), he developed a "numerical method" for analysing the frequency of symptoms and signs in a specific disease

and for assessing the effectiveness of treatments. With his "numerical method" he famously discredited the use of leeches in pneumonia.

Wilhelm Friedrich von Ludwig (1790-1865)

Ludwig was born near Stuttgart, son to a clergyman. When he was 14 he went to Neuenburg and became an apprentice to a surgeon. He then studied medicine at the University of Tübingen, graduating in 1811. In 1812 Ludwig served in a field hospital in Smolensk, which supported Napoleon's invasion of Russia, during which he fell ill and was imprisoned by the Russians. He was released two years later after assisting as a physician. In 1815 he was appointed Professor of Surgery and Midwifery at Tübingen. In 1817 Ludwig moved to Stuttgart after being promoted to be the royal family's personal physician. In 1836 Ludwig published his seminal work on Ludwig's angina, a potentially life-threatening infection of the floor of the mouth.

RESULTS AND DISCUSSION

Antoine, Pierre Alexandre, and Wilhelm Friedrich all have noteworthy contributions to the study of medicine. The question remains nevertheless, who was 'Louis'? Wilhelm Friedrich Ludwig is perhaps the easiest to eliminate on the superficial basis that he does not bear the Louis name. This, as the 20th edition of *Gray's Anatomy* points out, is likely due to "the Latin name *angulus Ludovici*" being "mistranslated into English as "the angle of Ludwig" (Gray, 1918). Indeed, on searching Ludwig's writing we found

no evidence of any connection to the sternal angle (Von Ludwig, 1936). *Gray's Anatomy* goes on to reference Antoine Louis as the origin of the eponym, which parallels other recent sources, and is arguably more plausible in light of his numerous publications regarding surgical anatomy. However, despite this initial optimism our searches of Antoine's writings were also fruitless. We found no mention of the elusive angle or any other related observations. Furthermore, references to the 'angle of Louis' start appearing in the literature around sixty years after Antoine's death, a sizeable period of time that undermines his possible association.

Finally, we turn to Pierre Alexandre Louis, also known as the 'great clinician', and, like Antoine, frequently referenced as the person behind the eponym. Unlike Antoine, Pierre Alexandre's lifetime overlaps with references to the phrase 'angle of Louis'. Furthermore, in one of the earliest discussions of the angle by Conradi (1848), Pierre Alexandre is acknowledged as first observing "the protuberance of the junction of the manubrium with the body of the sternum" (Goodman, 1910).

Contemporaries to Conradi do not however all agree, with Braune (1888) finding "nothing pertaining to the sternal angle" in Pierre Alexandre's writings. This led to others arguing that the name 'angle of Louis' should be dropped in favour of the name 'sternal angle'. To clarify Pierre Alexandre's involvement, we looked at his seminal work on pulmonary tuberculosis titled "Récherches Anatomico-Pathologiques sur la Phthisie" (Louis, 1825). This was a landmark scientific piece with a statistical study of 1,960 clinical cases and 358 autopsy dissections, with detailed exploration of pathological anatomy. Although deservedly regarded as a classic work of medicine, there was however disappointingly no mention of the manubrio-sternal junction. Pierre's other famous piece, "Récherches sur les Effets de la Saignée" (Louis, 1835), a polemic against bloodletting in pneumonia, also contained no references to the sternal angle (Morabia, 2006). After this unsuccessful search we discovered a paper by Goodman (1910), "An Historical note on the so-called Ludwig's Angle", which mirrored our own findings but also guided us to a lesser-known article by Pierre Alexandre Louis, which Goodman felt described the sternal angle. This piece titled "Recherches sur l'Emphysème des Poumons" is found in the *Mémoires de la Société Médicale d'Observation* (Louis, 1837), and looks at the shape of the chest in 37 cases of emphysema. Throughout this case series Pierre describes different 'prominences' which he observed to be present in emphysema. Of particular interest is a prominence he found "behind the clavicles", which he notes as either a unilateral or bilateral

sign in emphysema. Pierre goes on to propose that the 'degree' of this 'elevation' corresponded to the severity of the emphysema - "where the emphysema was remarkably developed, both supraclavicular regions were manifestly more prominent than in the natural state, though in different degrees". In our searches this was the only description in Pierre's writings that was at least anatomically near to the sternal angle. However, Pierre goes on to describe how this 'prominence' is distinct to emphysema and absent in his observations of tuberculosis. This leads us to conclude that, unlike our teachings of the 'Angle of Louis' as a normal midline anatomical landmark, it seems Louis first described a pathological lateralised sign which has perhaps been misappropriated over time. This returns us to the earlier argument that the name 'angle of Louis' should perhaps be relinquished for the name 'sternal angle'. Although the latter name is more descriptive, we feel nevertheless that Pierre Alexandre Louis for his medical achievements still deserves the honour of having this famous angle named after him.

After completing a detailed search of the writings of Antoine Louis, Pierre Alexandre Louis, and Wilhelm Friedrich von Ludwig, no direct formal mention of an angle between the manubrium and sternal body was found. The closest reference to the sternal angle was by Pierre Alexandre Louis in an observation of a pathological 'prominence' found in emphysema. We propose that the sternal angle must have been named in honour of Pierre Alexandre, although he did not himself characterise it as an anatomical landmark.

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