Ludwig Traube
The Man and His Space

THE MAN

Ludwig Traube was born in 1818 in Silesia. During his medical studies in Germany at the University of Breslau and later at the University of Berlin, he was influenced by Johannes Müller (1805-1858), François Magendie (1783-1855), René Laënnec (1781-1826), and Johann Schönen (1793-1864). The work of Laënnec on auscultation and percussion was to have deep influences on his thinking. In 1840, he received his medical degree from the University of Berlin and moved to Vienna, Austria, where he spent a year of stimulating work with Josef Skoda (1805-1881) (of “skodaic resonance” fame) in clinical medicine and with Carl Rokitansky (1804-1874) in pathologic anatomy. He returned permanently to Berlin in 1843, equipped to begin a career in experimental and clinical medicine.

During the early 19th century, Germany was in the throes of political and economic upheaval. The prevailing system of investigation at that time was one of Naturphilosophie, a speculative and mystical approach to medical practice and scientific understanding, largely influenced by the philosophers Friedrich von Schelling and Hegel. In the early 1820s, disillusioned by the “armchair theorizing” of their contemporaries and influenced by the French schools of Magendie and Claude Bernard (1813-1878), German physicians in the mold of Wilhelm von Humboldt (1767-1835) began to use scientific reasoning and controlled experimentation. It was at this critical transition that Ludwig Traube made his entry into the world of experimental medicine.

In 1847 Traube secured a position as Privatdocent at the Charité Hospital under Schönlein. This acceptance at Charité was later recorded by Traube as the happiest day of his life. Traube immersed himself in experimental medicine. One of his first papers, on pneumonia resulting from the cutting of the vagus nerves, appeared along with the experiments of Rudolf Virchow (1821-1902) on thrombosis and embolism in the early editions of a journal that Traube cofounded with Virchow. Traube’s work on suffocation was done in 1847, and he introduced the thermometer in his clinic in 1850. In 1853, he was made an assistant professor at Charité, and by this time he was married to Cora Markwald. Between 1862 and 1867, Traube went through turbulent times, suffering from angina pectoris and losing a son to diphtheria. However, the same period saw him describe the Traube-Herring waves. Traube had a particular interest in correlating clinical pulmonary disease with the underlying abnormality: he described the characteristic sputum of lung abscess and gangrene, he described putrid bronchitis, and, in the course of his study of “ileotyphus” (presumably typhoid fever), he de-
scribed the respiratory aspects of the disease, including the laryngitis and bronchitis. He demonstrated bronchial breathing in alveolar consolidation, coined the term metallic-sounding wheeze in asthma, and was able to describe accurately the clinical picture of pleurisy and croup. In 1872, he was nominated professor, and by that time had published two volumes of his work on physiology and clinical medicine. In 1872 he was nominated as an honorary member of the society of German doctors in Paris, and in the same year the famous William Osler visited the laboratories of Traube, Virchow, and French. Osler was so impressed that he is said to have stated his ambition was "to build a great clinic on Teutonic lines here in America . . . lines which have placed the scientific medicine of Germany in the forefront of the world." After the celebration of Traube's 25th anniversary at the University of Berlin, he received many honors and continued his academic tenure until his death due to angina and heart failure in 1876, only 2 months after his wife's death due to cancer.

THE SPACE

It is for his description of a semilunar space on chest percussion that Traube will be remembered. Anatomically the space is bounded medially by the left edge of the liver, laterally by the medial edge of the spleen, and superiorly by the lower border of the heart. The space can be mapped by dropping perpendicular lines down from the sixth rib at the costochondral junction and the ninth rib at the anterior axillary line to the costal margin. An irregularly quadrilateral space is thus defined (Fig 2).

In the winter of 1868, Traube was asked to see a young man admitted with fever, chills, headache, and a "stitch-like" pain in the left side of the chest. Traube noted the patient to be dyspneic and coughing up rust-colored sputum. Examination of the patient revealed a reduction in the half-moon space on percussion and decreased pectoral fremitus on the left. Moreover, the patient had loud bronchial breath sounds below the left scapula and a systolic rub over the sternum. The patient died 2 days later. On the basis of his clinical findings, Traube surmised the following: (1) The rusty sputum indicated an inflammation of the lung parenchyma, ie, pneumonia. (2) The diminution in the space associated with the stabbing left-sided chest pains indicated pleural exudate, ie, empyema. (3) The systolic rub over the sternum indicated an exudate around the heart. All of these findings were confirmed at autopsy. In another patient with an accumulation of pleural fluid due to trauma, Traube noted that resorption of the pleural fluid was heralded by an increase (a return to normal) in the size of the semilunar space, long before the dull percussion note over the affected lung resolved. Ironically, Traube did not write much more about this semilunar space, and it was left to his student Fraentzel to popularize this space: The fact that in the lowest part of the left thorax there is a tympanitic percussion note has been known for a long time. Investigation of this subject was undertaken recently by professor Traube.

![Fig 2.—Surface anatomy of Traube's space.](image)

![Fig 3.—Schematic drawing of percussion findings in the left lower hemithorax in a normal lung (left), consolidation (center), and pleural effusion (right).](image)
guha krish, md
anand karnad, md
department of internal medicine
east tennessee state university
johnson city, tn 37614

this article is dedicated to k. v. thiruvengadam, md, bedside clinician extraordinaire.

we gratefully acknowledge the assistance of christa dison in translating the german references, the expert secretarial assistance of joyce larimer, kim morris for assistance with the figures, and staff at the rare books section of the countway library of medicine, boston, mass, for their help in locating crucial references.

references
2. vergheese a, callemore g. kernig and brudzinski's signs revisited. rev infec dis. 1979;11:1187.
5. garrison fh. an introduction to the history of medicine. 4th ed. philadelphia, pa: wb saunders co; 1929:758.
8. jacoud s. trezieme lecon semologie de l'espace semilunaire. in: delahaye a, lecrosnier l, eds. lecons de clinique medicale faites a l'hospital de la pitie (1883-1884). paris, france: delahaye et lecrosnier; 1885:238-255.
10. traube i. zur lehre von der resorption pleuritischer exsudate mit bemerkungen uber die ursachen des tiefstandes des zwerchfelles auf der gesunden seite in faellen von umfanglichen pleuraexsudaten. klin untersuchungen. 1871:1:326-328.
12. neumann w. clinica de la tuberculosis, pulmom en el adulto. buenos aires, argentina: editorial labor; 1934.
13. barkun a, camus m, meagher t, et al. splenic enlargement and traube's space: how useful is percussion? am j med. 1989;87:562-566.
15. greganti ma. where are the clinical role models? arch intern med. 1990;150:259-261.

Profesor Jacoud, who undertook an intense evaluation of traube's space, emphasized two caveats regarding this sign. first, a reduction in the space may be the only sign of a subpulmonic pleural effusion. second, and more important, a reduction in the tympanism over the space could arise with pleural adhesions ("phrenocostal symphysis") and not solely from pleural effusion. given a patient with reduction in the semilunar space, differentiation between pleural fluid and adhesions would be possible by observing respiratory movements; in the latter, one would see a classic retraction of the lower intercostal spaces with each inspiration, a finding not observed in effusions. in the words of professor neumann, however, dullness over traube's space was highly sensitive for effusions: "this can reveal the presence of pleural effusions in the left pleura that sometimes can be missed by expert radiologists and this has been confirmed on multiple occasions by thoracentesis." traube never associated dullness in this space with splenic enlargement, a common misconception that persists today. a recent report suggested that percussion of traube's space compares favorably with other commonly used clinical maneuvers (none of which are sensitive) and is better than chance alone in determining the presence of an enlarged spleen.

we find demonstrating traube's space of the greatest utility (even in this era of portable chest roentgenography and ultrasound) as a specialized maneuver when dealing with a patient with dullness in the left hemithorax (fig 3). the maneuver can be performed with the patient supine or sitting. preservation of traube's space suggests that the dullness is from consolidation or atelectasis; if traube's space is obliterated, a pleural effusion is suspected. an exception may be the patient with consolidation of the left anterior basal segment and contiguous lingula, where the resonance of traube's space may be impaired (k. v. thiruvengadam, md, written communication, april 22, 1991). although each of these conditions will have their unique signs (bronchial breathing in consolidation, stony dullness and mediastinal shift in pleural effusion), we believe that accurate bedside diagnosis rests on the availability of more than one physical sign to buttress a diagnosis.

as the ward team troops en masse to radiology at the end of ward rounds, we, as long-time clinical teachers, continue to be amazed at the slack-jawed expressions of wonder on the faces of students and house staff when bedside diagnosis correlates with roentgenologic diagnosis—as if an insidious and deeply rooted distrust of the hands-on examination is being shaken. it is ironic that the ready availability of diagnostic technology has not, it seems, enhanced bedside skills but instead has encouraged their atrophy. the teaching of traube's space is a reminder of the remarkable bedside skills of years gone by; in addition, by invoking this medical eponym, the memory of a remarkable man lives on.

abraham vergheese, md
department of internal medicine
texas tech university
4800 alberta ave
el paso, tx 79905-1298