

PERSPECTIVE

Babinski's Signe de l'Éventail : A turning point in the history of neurology

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Purpose: The Babinski sign is a finding known since the start of the teachings of physical diagnosis by almost all medical students. This reflex is an incredibly helpful phenomenon that enables physicians to distinguish between central and the peripheral nervous system diseases right at the bedside. Yet, most students as well as physicians remain oblivious to the remarkable history behind the Babinski sign and what it means to evolutionary history of the modern neurological exam. We intend to study the birth of the "signe de l'éventail" (the fanning sign) and how it transformed medical diagnosis as we practice it today.

Methods: An extensive search was conducted through the Internet to identify historical documents referring to Babinski and other physicians who also observed the phenomenon as early as the 17th and 18th century. We also conducted a search through medical journals that examined the Babinski sign and its history.

Results: The Babinski reflex had been observed much

earlier than 1896, when Babinski referred to his finding for the first time. The reflex had been reported in the literature as far back as 1784 and afterwards re-observed several times before Babinski. However, it was Babinski who first offered an interpretation of the reflex and suggested that it was related to an organic disruption in the central nervous system. By identifying the sign, Babinski separated himself from Charcot in the sense of creating a new tradition in neurology where the findings in a neurological exam were of far more importance than just a plain history as his mentor had relied upon.

Conclusions: Babinski was not only responsible for suggesting the significance of such sign, but also transformed the role that physical diagnosis plays in modern medicine, where physical examination is key in revealing underlying pathology.

Key words: Babinski, Plantar reflex, Babinski sign, Signe de l'éventail, Modern neurological exam.

Since the very start of medical school every student is marveled by the famous Babinski sign. Most students eagerly stroke as many patients soles as they can find in the search for it. Most of the future physicians are aware of the power of such sign—it can help identify disease of the spinal cord and brain versus peripheral nervous system conditions. However, the pivoting turn provoked by this phenomenon in the history of neurology and on the physical exam we practice today remains ignored by many.

The Babinski sign refers to the pathological form of the plantar reflex, marked by extension of the hallus and fanning out of the rest of the toes. This abnormal event serves as a contrast to the normal plantar response involving a superficial reflex innervated by the fourth lumbar through the first or second sacral segments that result in activation of the tibial nerve with plantar flexion

and downward toe curling in response to noxious stimuli.

The plantar reflex had been observed in paralyzed animals since Czech anatomist and physiologist Jirí Prochaska's early experiments in 1784 and had been interpreted as a spinal reflex by physiologist Marshall Hall and Brigham in the 1840s (1-3). In 1874, German physician Karl Wernicke described toe dorsiflexion associated with hemiparesis and German neurologist Adolph Strumpell reported the phenomena in Amyotrophic Lateral Sclerosis; however, these neurologists simply called their observations a spinal reflex and did not provide any interpretation of it (4-5). German physician Ernst Julius Remak had also reported the sign in 1893, yet he too failed to offer a clinical significance (6).

It wasn't until 1896, when Joseph Francois Felix Babinski (1852-1932), son of a Polish engineer and pupil of French neurologist Jean-Martin Charcot, suggested that the fanning of the toes could be related to an organic disruption in the central nervous system (7). Babinski, following the footsteps of his mentor Charcot, had a strong interest in correlating clinical signs with neuropathological lesions. In contrast to Charcot, who relied more on neurological history than physical examination and rarely examined his

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patients, Babinski's greatest strength was that of exceptional observation at the bedside (8). Babinski and his colleagues focused on the neurological exam to differentiate between various forms of weakness, in particular that resulting from hysterical versus organic paralysis. This interest stemmed from Charcot's inability to find organic lesions in patients with hysterical paralysis; he had therefore concluded that a functional disorder was responsible for their symptoms (9). The fanning of the toes phenomenon accomplished the distinction Charcot had been unable to identify—the presence of an abnormal plantar reflex (a Babinski sign) absolutely excluded hysteria.

On February 22, 1896, Babinski gave a short presentation to the Société de Biologie in Paris where he referred to the toe phenomenon and associated it to organical disorders of the Central Nervous System:

“In [...] hemi- or crural mono-plegia due to lesions of the central nervous system, I have observed an abnormality in the cutaneous plantar reflex herein described. On the healthy side, pricking the plantar surface causes on the healthy side a normal flexion of the thigh, the leg, foot, and the toes at the metatarsal joint. On the paralyzed side, similar stimulation causes flexion of the thigh, leg and foot, *but the toes, instead of flexing, develops an extension movement at the metatarsal joint.*”
(Italics in original)

Later that same year, Babinski reported that stroking or tickling the sole of the foot provoked the same phenomenon and in 1903 he elaborated his finding to include not only an extension of the toe, but also the fanning of abduction of the toes (10). During this later occasion, Babinski explained that the sign was associated with central nervous system disease. The simplicity and clinical implications of the *signe de l'éventail* (the fanning sign) make it unique in medicine. Furthermore, Babinski's brilliant observations and his analysis of the phenomena marks the turning point in history where clinicians deviated from associating only clinical history and pathology and instead started to recognize the importance of the physical exam in revealing underlying pathology.

Babinski translated diagnostic workup to the bedside to identify objective neurological findings and developed one of the most fundamental tests that constitute the modern neurological exam. He thus played a crucial role in the evolution of physical examination in medical diagnosis. Even in this age where high technology constitutes one of the central pillars in diagnostic medicine, the neurological exam is still the basis for identifying clinically

relevant neurological disease and the Babinski sign is one of the most useful constituents of it.

Resumen

El signo de Babinski es un fenómeno muy conocido por la mayoría de los estudiantes de medicina aprendido en su curso de diagnóstico físico. Este reflejo es sumamente consistente en términos del potencial diagnóstico, ya que nos permite diferenciar entre enfermedades del sistema nervioso central y periférico. Sin embargo, un gran número de estudiantes y médicos desconocen la increíble historia que precede el signo de Babinski y la importancia que éste tuvo en la evolución del examen neurológico moderno. En este trabajo se estudia el proceso de descubrimiento del signo de Babinski y cómo éste transformó el examen neurológico y diagnóstico de hoy en día.

Se condujo un estudio extensivo a través del Internet para identificar documentos históricos relacionados con la vida y trabajo de Babinski y otros médicos que también observaron el reflejo desde los siglos 17 y 18. También, se investigó la literatura médica que examina el signo de Babinski y su historia.

El reflejo de Babinski fue inicialmente observado mucho antes que 1896, cuando Babinski lo describió por primera vez. El reflejo había sido descrito en la literatura en 1784 y luego varias veces antes de que Babinski lo describiera. Sin embargo, fue Babinski el primero en dar un significado al reflejo e indicar que éste sucedía a causa de una interrupción en la función del sistema nervioso central. Al identificar este signo, Babinski se separó de la corriente de su mentor Charcot al crear una nueva tendencia en el campo de la neurología donde los resultados de un examen neurológico eran mucho más importantes que el historial médico en el cual Charcot dependía principalmente.

Babinski no sólo fue el primero en ofrecer una explicación al signo de Babinski, pero también transformó el papel que juega el examen neurológico en la medicina moderna, donde los resultados del examen físico son clave para deducir y diagnosticar la patología del paciente.

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