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History of Neurology

Jean-Charles Chatelin (1884–1948), counted among the "Righteous", but forgotten as a neurologist who studied under Pierre Marie

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ABSTRACT

Charles Chatelin (1884-1948) studied under Pierre Marie (1853–1940) at *hôpital* La Salpêtrière and went on to a career profoundly affected by World War I. He wrote a remarkable thesis on the clinical aspects and radiography of hereditary craniofacial dysostosis, which had been recently described by Octave Crouzon (1874–1938). A few days after the publication of Georges Guillain (1876–1961) and Alexandre Barré (1880–1967), Chatelin published a comprehensive study of the eponymous syndrome. His study was prepared before that of Guillain and Barré, but only their names are remembered. After examining patients with spinal injuries, Chatelin and Pierre Marie gave the first description of what would become, in 1924, "Lhermitte's sign." The eponym was first used after this sensory symptom was added by Lhermitte to the clinical picture of multiple sclerosis. In 1915, Chatelin and Pierre Marie used a technique based on radiographic overlays to localize intracranial projectiles. They coupled this with precise examinations of the visual field of wounded soldiers, in order to map out the intra-cerebral visual pathways with accuracy. During World War II, Chatelin and his wife demonstrated their empathy by hiding a Jewish family in their home until Paris was liberated.

Mots clés :
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RÉSUMÉ

Charles Chatelin (1884–1948) est un élève de Pierre Marie (1853–1940) à La Salpêtrière qui a vu sa carrière profondément affectée par la guerre de 1914–1918. Il est l'auteur d'une thèse remarquable consacrée à la clinique et à la radiographie de la dysostose crânio-faciale héréditaire, alors récemment isolée par Octave Crouzon (1874–1938). Chatelin publie quelques jours après Georges Guillain (1876–1961) et alexandre Barré (1880–1967) une étude aboutie du syndrome éponyme, et élaborée bien avant celle dont les noms sont demeurés dans les mémoires. Après examen de blessés médullaires, Chatelin et Pierre Marie donnent la première description de ce qui deviendra, en 1924, « le signe de Lhermitte », après que Jean Lhermitte (1877–1959) ait ajouté ce symptôme sensitif à la clinique de la sclérose en plaques. Les techniques de calques radiographiques localisant les projectiles intracrâniens couplées

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à la finesse de l'examen du champ visuel des soldats blessés permettent à Chatelin et Pierre Marie de dresser en 1915 une cartographie des voies visuelles intracérébrales, améliorée par rapport aux connaissances antérieures. À la fin de la deuxième guerre mondiale, Chatelin et son épouse ont sauvé de la mort une famille juive abritée secrètement à leur domicile jusqu'à la libération de Paris.

Jean-Charles Chatelin was born on 22 May 1884 in Charleville (north-eastern France). His first name is usually given as Charles. Unfortunately, this usage often creates confusion due to the many homonyms. There are no biographical articles on Chatelin, the student of Pierre Marie (1853–1940), and the Société de neurologie de Paris (French Neurological Society) did not print an obituary when he died on 30 January 1948. The present paper hopes to make up for this oversight.

In 1906, Chatelin ranked 110th in the *externat* examination (*externe* = non-resident student at a teaching hospital). His teachers, Jean Darier (1856-1938) at *hôpital* Broca and Albert Mathieu (1855–1917) at *hôpital* Saint-Antoine, considered him ''an excellent *externe*, hard-working and intelligent; his work is fully satisfactory''. In 1908, he ranked 10th in the *internat* (house officer or residency) examination and entered in the same class as Henri-Mondor (1885–1962). In 1910, he was a resident under Paul Muselier (1849–1914) and Ernest de Massary (1866–1955) at *hôpital* Hôtel-Dieu. In 1911, he worked with the paediatrician Gaston Variot (1855–1930) at *hôpital* des Enfants-Malades, where he met his wife. Finally, in 1912 and 1913, Pierre Marie (1853–1940), who at that time directed the ''Jacquart department'' at *hôpital* La Salpêtrière (Figs. 1 and 2) [1], considered him ''an excellent resident''. After his thesis, defended in 1914, Chatelin was mobilized. His time as chief resident under Pierre Marie, who was elected to the Chair of Nervous System Diseases in 1917, started in 1919 and continued until 1922.

In 1939, Chatelin was mobilized again in a military hospital in Clermont-Ferrand to treat neuro-psychiatric diseases of French soldiers. Chatelin and his wife, Marie-Louise Peltier-Chatelin (1888–1971), who was admitted as a resident in 1912 (Fig. 3), had five children. They lived in a vast apartment at 30 av. Marceau in the 16th *arrondissement* in Paris. Marie-Louise was a paediatrician and worked in the ''*la goutte de lait*'' dispensary in Belleville (a modest district in the eastern part of Paris). On 25 March 1944, Dorothée

Fig. 1 – Residents at *hôpital* de la Salpêtrière in 1913, Charles Chatelin on the right (© Bibliothèque interuniversitaire de santé (BIU) santé, Paris).

Fig. 2 – On the second row, Marie-Louise Peltier (Chatelin), on the left and Charles Chatelin in the middle. La Salpêtrière, 1912 (©BIU santé, Paris).

Fig. 3 – Seated on the right, Marie-Louise Peltier-Chatelin, resident in 1919 (©BIU santé, Paris).

Morgenstern and her newborn baby came in for a consultation. Morgenstern related the arrest and deportation of her husband in October 1943 [2]. Her two sons, Henri and Jacques, had been sent to live with a grocer and his family in La Chapelle-du-Bois-des-Faulx (northern France), which had been arranged by Dr. Rita Breton of L'Œuvre de secours aux enfants (OSE), an organization for child welfare. The Chatelins took this young mother and her baby into their home, hiding them until the Liberation, saving them in an act of great generosity from certain death. For their courageousness, on 3 June 1982 they were recognized as ''Righteous Among the Nations''.

1. Doctoral thesis

Chatelin defended his thesis in 1914 entitled: *La dysostose cranio-faciale héréditaire* (hereditary craniofacial dysostosis), a disease described in 1912 by Octave Crouzon (1874–1938) [3]. He studied four cases, including one of his own, and their genealogy, and concluded that the survey was valid: ''This type of clinical picture deserves, from a nosographical point of view, a special denomination''. The signs include: cranial malformation that appears during the first years of life and thus is not congenital, facial malformation predominantly on the forehead (bump), the chin (prognathism), and the nose (enlargement of the root), and exophthalmos with strabismus (Fig. 4). He highlighted its hereditary familial nature and provided specific radiological criteria for differential diagnosis with other forms of craniofacial dysostosis and oxycephaly. Intelligence is not affected but epilepsy is possible. In addition to the detailed accuracy of his descriptions, Chatelin's thesis is original with its novel radiographs of patient craniums and its meticulous analysis.

2. Presentations at the Société de neurologie before World War I

Together with Ernest de Massary (1866–1955), Chatelin presented his first clinical case at the Société de neurologie on 10 February 1910: a 26-year old man who died of transverse myelitis. The initial lumbar puncture made it possible to attribute it to a meningococcus. The autopsy found ''a purulent effusion in the epidural tissue and the arachnoid mater'' ascending up to the cervical enlargement [4].

Chatelin's presentations at the Société de neurologie were frequent until the end of the war, then less frequent, finally ending in 1927. His subjects included all fields of neurology. He worked on these presentations with several colleagues. The most known among them were Gustave Roussy (1874–1948), Jean Lhermitte (1877–1959), Crouzon, André Léri (1875–1930), and of course his teacher, Pierre Marie. Two names were most frequently associated with his (in part because of the war): Henri Bouttier (1888–1923), a resident and later a senior resident under Pierre Marie at the same time as Chatelin, and also the surgeon Thierry de Martel (1875–1940).

Chatelin, Bouttier and de Martel worked assiduously to care for the wounded in the Militarized Neurological Centre at La Salpêtrière (Fig. 5). While neurosurgery in Paris started under the scalpel of Antony Chipault (1866–1920) at the end of the 19th century, de Martel was in fact the first Parisian neurosurgeon, encouraged by Joseph Babiński (1857–1932), who had him perform the first excision of a cerebral tumour in 1909 [5]. Treating cranial wounds required medical and neurosurgical skills that de Martel and Babiński developed together. They shared their knowledge and experiments by publishing their articles in the *Revue Neurologique* and in books. On 5 December 1912, de Martel and Chatelin presented to the Société de neurologie a 46-year-old patient hospitalized in the department of Pierre Marie for generalized epilepsy, unilateral blindness with macular oedema during ophthalmoscopic examination, stiffness in the neck, somnolence, and paradoxical euphoria. After an initial decompressive surgical intervention, five months later the patient underwent excision of a frontal tumour (gliosarcoma). Initially there was clear improvement. Chatelin discussed the symptoms, especially the stiffness in the neck and the neuro-psychological disturbances, which suggested frontal localization [6]. On 8 May 1913, de Massary and Chatelin made a presentation to the Société de neurologie on the difficulties of establishing the differential diagnosis between an abscess and a cerebral tumour, concerning a 12-year-old child who underwent surgery for a temporal abscess during chronic otitis, who in fact had a large glioma that had infiltrated the temporal lobe, as shown during autopsy [7].

Pierre Marie, Crouzon, and Chatelin expressed their surprise at having gathered six observations within a few weeks in 1913 where the patients suffered from various forms of paraesthesia of an upper limb and who presented, upon examination, amyotrophy and abolition of reflexes secondary

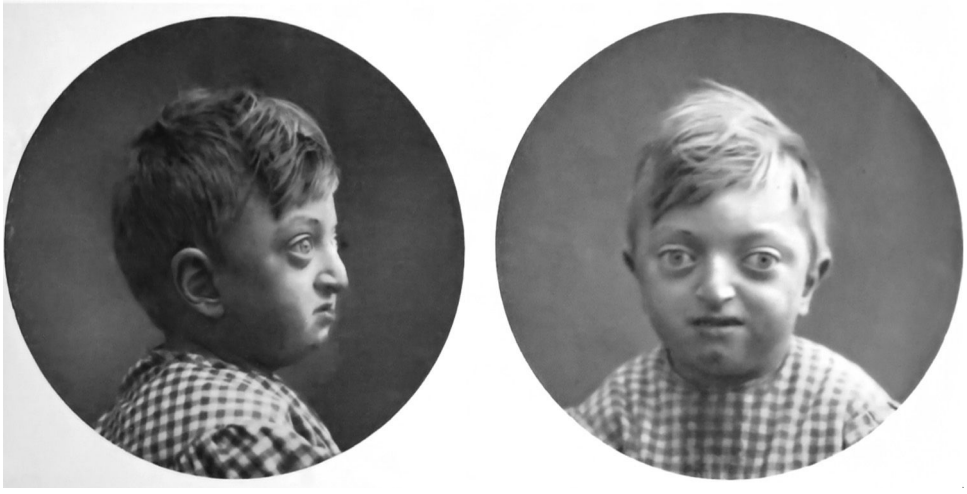

Fig. 4 – A case of hereditary craniofacial dysostosis, characterized by ocular hypertelorism, small beaked nose, proptosis, exophthalmos, hypoplastic maxilla and mandibular prognathism. Reproduced from the thesis of Charles Chatelin (©BIU santé, Paris).

Fig. 5 – Chatelin is seated to the left of Pierre Marie. Charles Foix is behind him, Henri Bouttier, in white, is standing to the right, Gabrielle Lévy is seated in front of him, C. Athanassio-Benisty is seated at left. La Salpêtrière, probably in 1916 (©Académie nationale de médecine, Paris).

to a cervical rib. According to them, the real frequency of this anomaly was underestimated because care was not taken to look for it. They advised physicians to examine their patients carefully when their chief complaints were sensitive disturbances [8].

At the session on 10 July 1913 of the Société de Neurologie, Pierre Marie, Chatelin and de Martel presented the results of ''eighteen months of nervous system surgery in the La Salpêtrière department''. They of course could not know that within a year, surgeons would perform this operation often and continue to improve it. Of twenty-nine patients undergoing spinal cord and brain surgeries, always performed at a late phase, nine died during the operation. Fourteen benefited from the surgery, probably temporarily because the decompression skull flaps treated the intracranial hypertension, but not the underlying tumour [9].

Clinical questions played an important role in the presentations at the Société de neurologie during this time. Chatelin's presentation on 6 November 1913 is one example. Referring to three cases of amyotrophic lateral sclerosis, Chatelin found persistence of the plantar reflex in the flexed position when the amyotrophic damage was mild in the lower limbs, despite severe damage in the upper limbs and medullary damage [10]. To conclude 1913, Chatelin and Crouzon described a new case of craniofacial dysostosis, which is now referred to as the eponym ''Crouzon's syndrome'' [11].

At the session on 12 February 1914, Chatelin presented a 14-year-old girl who, after an infection at age 6, had several associated symptoms: a sort of mutism (buccal dystonia?), abnormal choreoathetosic movements, spasmodic torticollis with antagonistic gestures, and tics. His findings were discussed by Henry Meige (1866–1940) who confirmed the organicity of the pathology. Damage to the basal ganglia and the medulla were noted. On the other hand, Gilles de la Tourette disease was not even mentioned [12].

Chatelin gave presentations at practically all of the sessions of the Société de neurologie until war was declared on 3 August 1914. Chatelin's presentation of cases of multiple sclerosis, subacute combined degeneration of the spinal cord with pernicious anaemia, ophthalmoplegic migraine, syringomyelia, and syphilitic meningitis, are evidence of his wide-ranging neurological knowledge.

3. Pierre Marie's department at La Salpêtrière when World War I started

Pierre Marie received the first injured soldiers on 6 November 1914, in the Grand et Petit Pinel rooms at the La Salpêtrière, then at the end of December 1914, in the Grand et Petit Barth rooms. By 20 January 1915, more than one hundred patients had already been admitted. The surgeon Antonin Gosset (1872–1944) had performed operations on twelve of them. From the first report to the military authority, Pierre Marie complained that the wounded were coming in too late, with inaccurate lesion diagnoses when they reached his department. Pierre Marie was also worried about the high number of ''simulators'' without ever considering their experience in combat. He complained to the same authorities that he did not have sufficient means to continue to care for the more than 1500 hospitalized patients, in addition to the wounded. In addition, the size of his department had decreased due the mobilization of his medical personnel: ''Examining these neurological injuries is extremely time-consuming and difficult, and it has very interesting and significant scientific and social implications. This makes the task a considerable one, and I am honoured

that it has been assigned to me, but I would ask the Military Authorities to facilitate this task''.

In early 1915, Pierre Marie was assisted by Meige but no longer had a senior resident. Only one resident, Chiriachitza Athanassio-Bénisty (1885–1938), remained in the department. Athanassio-Bénisty, born in Brăila, was the first Romanian woman to receive a literature-philosophy degree from the Académie de Paris in 1906 [13]. In 1913, she served as an *externe* in the department of Pierre Marie. Then she was a resident from 15 February 1914 to 30 April 1916 before working as a resident under Dejerine [14]. In June 1915, one hundred and fifty beds were reserved for the wounded. During 1915, the department benefited from the knowledge and skill of foreign doctors and students such as J.-S. Patrikios [15] and the Russian Konstantin Tretiakoff (1892–1958). Gabrielle Lévy (1886–1934) was initially an *externe* (07/06/1915 to 01/10/19818) before becoming a resident under Pierre Marie (02/10/1918 to 31/10/1919) and was eventually in charge of his laboratory [16,17]. Chatelin, *médecin major de première classe*, and Pierre Béhague (1891-1970), an auxiliary physician, returned from the front to La Salpêtrière as military assistants [18]. Pierre Marie succeeded Dejerine in 1917, thus becoming the head of the Clinic of Nervous System Diseases at La Salpêtrière, with more than 300 beds reserved for the wounded. Charles Foix (1882–1927) joined the department from 30 January 1915 until he left for the eastern army on 2 September 1916 (Fig. 6). According to Pierre Mollaret (1898–1987): ''Times had changed; the ambience no longer allowed the methodical and slow work of the laboratory, and the students had left for the army. Collaborating with Henry Meige, Charles Foix, Chatelin, and Bouttier at La Salpêtrière, Pierre Marie studied war injuries and trauma. He provided useful documentation and established important theoretical and practical conclusions on war neurology. He thus served our injured soldiers heroically'' [19].

4. Work of Chatelin during WWI

Chatelin's first presentation to the Société de Neurologie, once he was back from the front, took place on 29 July 1915. Chatelin was confronted for the first time with a blast injury, one of the new phenomena of this war. A large bullet exploded a few meters from a soldier and knocked him down, without producing visible injury. He was able to walk for two hours. The following morning, his right leg was totally paralysed and the left partially paralysed. Chatelin suspected hematomyelia and hypothesized a physio-pathology: ''There was a release of gas in the blood with gaseous embolism and capillary rupture'' [20].

On 7 October 1915, Pierre Marie and Chatelin presented a voluminous dissertation describing multiple types of hemianopsia and scotoma [21]. Using an ingenious method whereby radiographs of cadavers were superimposed on patient radiographs, they succeeded in localising lesions and improving their understanding of cortical visual pathways: ''The cortical vision centre is located at the calcarine fissure and at the adjacent cortex. We can also affirm that the systematisation of the cortical visual sphere is such that the upper quarter of the retina on one side projects to the upper bank of the calcarine fissure on the other side. The destruction of the latter leads to hemianopia in the lower quadrant, and that a limited lesion of the cortical visual sphere on one side results in hemianopia scotoma in each half of the visual field on the opposing side [. . .]. As to the much-debated question of the projection of the macula on the calcarine cortex, our observations are clearly in favour of a posterior localisation around the area of the occipital tip [. . .]. Finally, we have found nothing to justify the existence of a special cortical centre for the vision of colours''. After recommending systematic radiography to confirm the presence of an intracranial bullet, Pierre Marie and Chatelin considered surgical intervention

Fig. 6 – Pierre Marie (aged 65) with his chief residents in 1922, Chatelin on his right and Bouttier on his left. Marie-Louise Chatelin seated at left next to E. Demetru Paulian. Gabrielle Lévy at right in the second row (© Académie nationale de médecine, Paris).

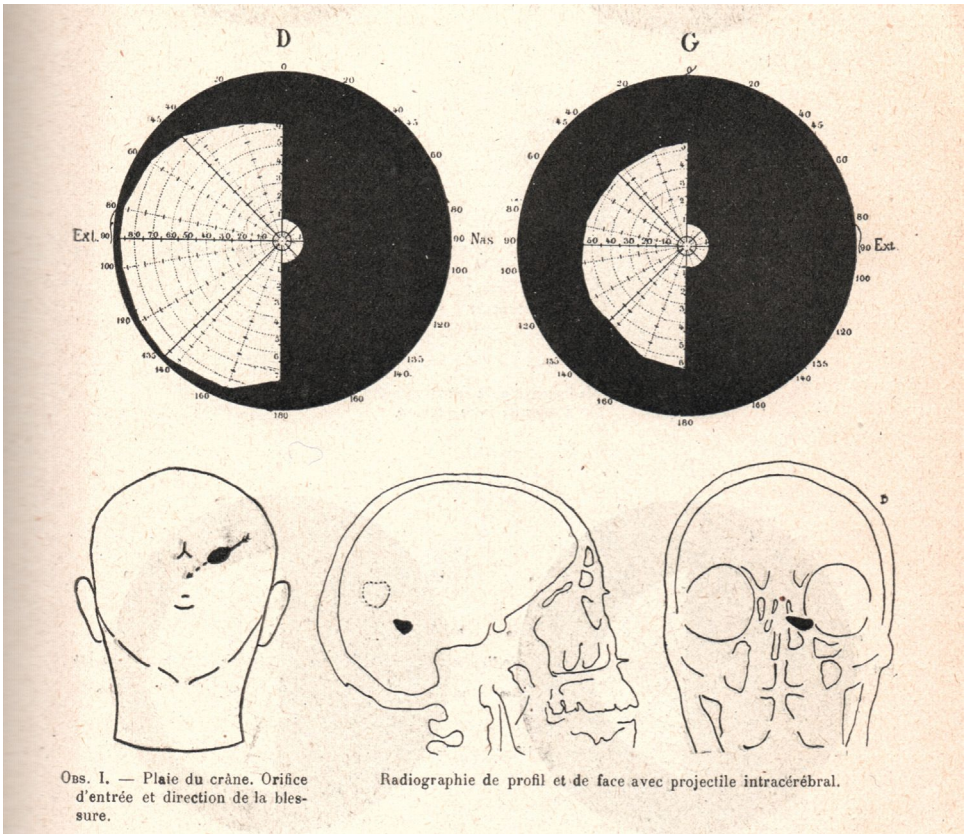

Fig. 7 – Hemianopsia and intracranial bullet in the occipital lobe (library of the author).

counter-indicated, unless there was an abscess to treat, in order to prevent worsening the loss of vision. In 1916 and 1917, they added to this dissertation with the publication of other clinical cases involving visual deficits due to intracranial projectiles (Fig. 7). Their work correlates to the innovative study published in 1909 by the Japanese ophthalmologist Tatsuji Inouye (1881–1976) after the Russian-Japanese war (1904–1905) [22]. Among discoveries of damage to visual pathways during WWI, those made by the Irish neurologist Sir Gordon Morgan Holmes (1876–1965) [23], the German Walthur Poppelreuter (1886–1939), and the Australian George Riddoch (1888–1947) remain more well-known than those of Pierre Marie et Chatelin [24].

5. At the session on 12 October 1916, Chatelin and Patrikios discussed a patient suffering from ''sensory Jacksonism,'' or partial sensory Jacksonian epilepsy, secondary to a bullet wound affecting the post-central gyri convolution. The seizure involved paraesthesia moving down the arm contralateral to the wound, from the shoulder to the hand, in the space of two to three minutes. The hand became numb during the seizure. These deficits totally disappeared after the seizure [25].

On 11 November 1916, Pierre Marie and Chatelin [26] gave an innovative presentation at the Société de Neurologie. After observing three similar cases among three hospitalized soldiers, Chatelin described a fourth affected soldier. ''In a few days, without marked painful phenomena, except for a degree of rachialgia, he experienced paraplegia or complete flaccid quadriplegia, with abolition of tendon reflexes, weakening of skin reflexes, disturbances of all types of superficial sensitivities in the form of hypoesthesia that was more marked toward the extremity of the limb than toward the root, pain at pressure on nerve trunks and muscular masses, and temporary urine retention''. The disturbances progressively regressed, in around three months. The examination of cerebrospinal fluid eliminated the possibility of syphilis and allowed detection of a ''massive'' hyperalbuminemia in the absence of lymphocytosis. Pierre Marie and Chatelin added an important footnote:''Mr. Guillain, Mr. Barré, and Mr. Strohl published very similar cases in the Bulletin de la Société médicale des hôpitaux de Paris in 1916. The authors arrived at conclusions similar to our own. But we learned of their work only after our presentation at the Société de neurologie'' [27]. Barely a month before Chatelin's presentation, Georges Guillain (1876–1961), Jean-Alexandre Barré (1880–1967), and André Strohl (1887–1977) published two cases of patients with the same clinical picture on 13 October 1916. These three physicians finished their study and published them after the war. Their posthumous celebrity is due to the eponym ''Landry-Guillain-Barré syndrome'' or more commonly ''Guillain-Barré syndrome'' [28]. Pierre Marie and Chatelin did not present their observations to the Société de neurologie until they had four well-studied cases with patients monitored up to their recovery. Guillain only found improvement in one case and published his results more rapidly with

data from only two soldiers [29]. Unlike Octave Landry [30] and Alfred Vulpian [31], who had only observed constantly fatal forms due to medullary damage (lumbar puncture was not yet in use), all of the affected soldiers treated by Chatelin recovered without any significant sequelae. By the random effect of dates, and more certainly because of the clinical rigour of Marie and Chatelin, they were not attributed the world-wide celebrity enjoyed by Guillain and Barré (the essential role of Strohl has been forgotten).

Reporting on the clinical cases observed among patients treated in the department, on 20 December 1917, Pierre Marie presented Chatelin's observations of patients with cranial injuries: ''Several weeks after the accident, once the cranial wound has healed, the patients experience, upon waking up, such numbness in the limbs that it is impossible for them to move [...] In addition, the patients say that when they cough or sneeze, or when they lower their head with force, they feel temporary pins and needles and numbness in the arms and even the legs'' [32]. Since their clinical examinations did not detect any objective neurological anomalies, they proposed that the pathophysiology ''involved damage to the cervical rachidian roots, a sort of remote contusion produced by the cerebrospinal fluid which is incompressible on the arachnoidian culs-de-sacs''. At the session on 4 March 1920 of the Société de Neurologie, Jean Lhermitte (1877–1959) reviewed the clinical aspects of this symptom, for which he also presented observations, with the aim of starting a discussion on the pathophysiology of the diverse painful forms of spinal commotion [33]. He distinguished between this pain, which victims of cervical trauma described as an electrical discharge when the neck was flexed, and other radicular, hyperalgesic, or causalgic pain. Jean Ribeton (1889–1968) wrote his thesis on this subject in 1919, inspired by Babiński [34]. At the session on 3 July 1924 of the Société de Neurologie, Lhermitte presented an observation prepared with the assistance of Jacques Bollack (1883–1951) and Maurice Nicolas (1883–1966) which ''seems a good example of the 'sensory form' of multiple sclerosis due to the accumulation and diversity of pathological sensations that the patient experiences'' [35]. By parallel analysis of the complaints of soldiers with spinal injuries and those of patients with multiple sclerosis, Lhermitte, who persevered in his analysis, made sense of the clinical and prognostic aspects, allowing confirmation of multiple sclerosis early on. The eponym ''Lhermitte's sign'' was first used after the 21 November 1929 presentation by Hugh Talbot Patrick (1860–1939) to the Chicago Neurological Society. He entitled his presentation ''Lhermitte's symptom in a patient with multiple sclerosis'' [36]. Chatelin and Pierre Marie were thus the first to have recognized this symptom (and not a sign) [37], but it should not be forgotten that, a few days later, on 10 January 1918, Babiński and Robert Dubois (1884-?) made a presentation to the Société de neurologie on the case of an officer who was ''injured in the neck with a stiletto, and immediately felt the sensation of electrical discharge in the entire right side with temporary right hemiplegia. There was still a mild Brown-Sequard syndrome. In addition, for a month, every time the patient bent his head forward, sneezed, or coughed, he felt a sensation of electrical discharge, starting in the neck and irradiating violently along the right arm and leg. The sensation is weak but clear in the left arm and the top crease of the left thigh'' [38].

Among Chatelin's operations in 1917, that described by de Martel on 8 November 1917 involved risk of sudden death during surgical excision of a spinal tumour through circulatory collapse. This was prevented by constant monitoring of arterial pressure and the use of ''*surrénaline*''; that is, adrenaline. De Martel called for replacing this medication, on the advice of Chatelin, with a medication with greater efficacy, ''hypophysine''; that is, an extract of the pituitary gland, which most likely triggered a liberation of cortisol, adrenaline, and anti-diuretic hormone [39]. The same day, de Martel and Chatelin reported on the successful excision of a tumour of the cerebellopontine angle. However, this required them to perform partial excision of the cerebellum, with the obvious serious sequelae.

In 1918, like other French neurologists at the time, Pierre Marie, Chatelin, and Behague were the target of an aggressive complaint lodged by a group of soldiers treated by electrical therapy at La Salpêtrière. Derived from Babiński' approach ''*la méthode brusque*'', many physicians believed that the treatment of hysterical soldiers required physical strength. The application of electrical shocks, known as ''torpillage'' (literally ''torpedoing'') was frequently used to weaken a patient's pithiatic resistance to persuasion. After Baptiste Deschamps, a soldier who was sent to Clovis Vincent (1879–1947), has punched the physician, out of fear of electrocution, he was tried before a military tribunal and found guilty of assault. But the public outcry on his behalf, voiced in the popular press, forced military administrators to give him a lenient, suspended sentence. This recent conclusion explains perhaps why an investigation was opened by the French Health Service, without sentencing against Chatelin and his master [40,41].

The painter Fernand Léger (1881–1955) left an account of his meeting with Chatelin at La Salpêtrière. He hoped to be relieved of his army duties: ''I have already started visiting specialists [...]. The nervous system approach is currently being used. I am now at La Salpêtrière being seen by the famous Chatelin. They strike me with little hammers all over my body. They make me look in every direction'' [42].

5. *Blessures du crâne et du cerveau*, 1917

The book entitled ''*Blessures du crâne et du cerveau*'' (Wounds of the skull and brain), by Chatelin and de Martel, was analysed by Béhague in the *Revue neurologique* of June 1917:''This book is undoubtedly one of the best and most well-documented works on war neurology''. As Pierre Marie noted in his preface, this book resulted from the examination of more than 5000 soldiers with cranial injuries treated at La Salpêtrière since the war began:''[Chatelin] especially is worthy of praise for having developed, to a phenomenal degree, our External Consultations Service at La Salpêtrière, of which he has been the essential champion [...]. My collaboration with Charles Chatelin has been constant. We are so close that I feel some modesty at describing my high esteem for him. A single word is enough, as I see it, to summarize all possible praise: he is an unrivalled clinician''.

As noted in an unsigned editorial published in the journal La Presse médicale:''The war was a painful but edifying school for

experimental pathology of the human nervous system. Projectiles that penetrate, cut or cause contusions mercilessly subjected our soldiers to a great number experiences that, up until then, only laboratory animals had undergone. Immediately striking back, surgeons identified the lesions, allowing them to accurately determine their location and type. Procedures performed after some delay revealed the later stages of repair or degeneration of nervous tissue. Offensive and defensive experimentation was thus carried out on human beings, who swiftly taught us a great many lessons'' [43].

Chatelin started out by presenting a ''plan for observing the injured soldier'' to describe all circumstances of the injury, starting with removal from the war zone on a stretcher, up to arrival at La Salpêtrière. This was followed by a complete, rigorous neurological examination. Headache, dizziness, and insomnia were the subjective disturbances most often reported. One of Chatelin's constant concerns was to describe as accurately as possible the cranio-cerebral topography of the lesions, which led to developing external mapping together with radiography using lead overlays. Chatelin then listed the various localizations and their consequences. He noted that significant loss of cerebral tissue in the frontal area seemed to have the least serious consequences: ''The slight symptomatology of frontal lobe injuries in part explains the fact that frontal injuries are relatively benign''. The wealth of cases reported by Chatelin can only be summarized here, but we should highlight Chatelin's vast knowledge of the localization of cerebral activity, notably based on cerebellum injury. Secondary infection, a major concern of medical personnel, was the primary cause of mortality in injured soldiers in the short term.

In the second part, de Martel discussed the surgical treatment of patients: ''In general, there is no urgent reason to operate on patients with cranial injury'' given that, in spite of the very high frequency of intra-cerebral objects (bone fragments, shrapnel, bullets), their extraction increases tissue damage as well as the frequency of fatal infections. At this time, de Martel preferred local to general anaesthesia for surgery and used ''a powerful magnet'' to extract foreign metal objects rather than a gripping tool. He also placed the patient in a sitting position for surgery. He obsessed over secondary oedema with cerebral herniation. Cranioplasty techniques for aesthetic recovery formed the basis for the concluding section. In general, the work's iconography is spectacular and varied.

The success of this work led to an English translation in 1918 [44] and to a second French edition in 1918. The editor divided the latter into two separate volumes, one with the work of Chatelin and the other with the work of Martel. Each contained new data.

6. Cerebral tumours

In 1921, Pierre Marie set up a series of twenty conferences, each organized around a specific neurological theme. In the first lecture, Samuel Alexander Kinnier Wilson (1878–1937), from the National Hospital for Neurology at Queen Square in London, presented to his French counterparts the clinical picture of ''progressive lenticular degeneration'' or Wilson's disease, which he described in 1912. Chatelin gave the second lecture, on cerebral tumours. He spent most of his presentation on clinical aspects. After headache, Chatelin described the pathophysiology of macular oedema. He did not neglect to highlight its localization value ''in Jacksonian epilepsy'' and in psychic disorders accompanying frontal tumours. He reviewed the different localizations, focusing on cerebellopontine angle tumours, which the surgery of de Martel made it possible to cure. For Chatelin, lumbar puncture in decubitus position remained indispensable, especially for measuring the pressure of the fluid and eliminating haemorrhage or tuberculosis. Most often, the treatment involved decompressive trepanation without opening of the dura mater [45].

7. Chatelin and the treatises of medicine

In the *Traité de Pathologie médicale et de Thérapeutique appliquée* (Treatise of medical pathology and applied treatment) of Emile Sergent (1867–1943), published in 1924, Chatelin wrote four chapters: congenital muscular atonia (Oppenheim's disease), progressive hemifacial atrophy, spasms, and tics. His description of tics shows that, at that time, motor tics had not been differentiated from dystonia. Gilles de la Tourette's disease was not mentioned and would be forgotten for more than fifty years.

Chatelin wrote a chapter, *Syphilis de la moelle* (syphilis of the spinal cord) in 1935 in the *Nouveau Traité de Médecine* of Roger-Widal-Teissier. It successively examined transverse myelitis, Erb syphilitic spinal paralysis, diffuse syphilitic meningomyelitis, pseudo-syringomyelitic forms, spinal meningeal tuberculous gumma, and syphilitic multiple sclerosis. The clinical distinction between all of these syphilitic varieties of spinal disease no longer seems relevant.

8. In conclusion

This incomplete overview of the works published by Charles Chatelin shows that he has been unjustly forgotten. Whether for Guillain-Barré syndrome or ''Lhermitte's sign'', Chatelin was the first to notice the originality of the clinical picture even though medical history has remembered other names over his. Why his memory was not honoured in any medical journal at his death in 1948 remains a mystery.

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