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## HISTORICAL NOTE

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## Queckenstedt's manoeuvre

This paper describes the beginnings of the measurement of CSF pressure and its physiological fluctuations by Queckenstedt that culminated in his clinical test for spinal canal obstruction.

In 1891, Walter Essex Wynter, physician to the Middlesex Hospital, described the insertion of a Southey's tube to withdraw infected cerebrospinal fluid (CSF) to reduce CSF pressure in meningitis. One month earlier, Heinrich Irenaeus Quincke (1842–1922), who held Chairs in Berne and then Kiel, described lumbar puncture.<sup>1</sup> The procedure was quickly established.

Hans Queckenstedt, while serving in the army in 1916, devised his test to detect spinal cord compression. He described:

"The narrowed [spinal] channel impedes movement of fluid with an increase in pressure above the compression site... The increment in pressure above the obstruction can be demonstrated by compression of the neck..., which produces an increase in venous blood in the cranial cavity, with concomitant reduction in space for the cerebrospinal fluid... The increased fluid pressure immediately transmitted throughout the system normally can be demonstrated with a... manometer attached to a lumbar puncture needle. In lesions of the cord the manometric change is greatly retarded."<sup>2</sup>

Its occasional use is still described,<sup>3,4</sup> although it has been mainly replaced by imaging, usually magnetic resonance imaging of the spinal canal. The lumbar puncture was performed with the patient in lateral decubitus position. Queckenstedt measured the opening pressure. Then, his assistant compressed both jugular veins, which led to a sharp rise in the pressure of the spinal fluid transmitted to the lumbar region within 10–12 seconds, succeeded by a fall when jugular pressure was released. If there was stenosis in the spinal canal, there was a reduced or absent response in the manometric pressure, recorded as a positive Queckenstedt's manoeuvre.

It is said<sup>5</sup> that the Guy's Hospital surgeon and anatomist John Hilton (1804–1878) "on the basis of investigation of a corpse" described the phenomenon earlier, in 1863. Simultaneous cerebral and spinal fluid pressure recordings are a later extension of the manoeuvre, used to show cerebrospinal dissociation in lesions at the foramen magnum.<sup>6</sup>

## Hans Heinrich Georg Queckenstedt (1876–1918)

Born in Leipzig, son of an impoverished schoolmaster, Queckenstedt graduated from Leipzig University in 1900. A pupil of Emil Kraepelin (1856–1926), he trained with Ganser and obtained his doctorate in 1904, and then went to work with Martius in Rostock. His studies of iron metabolism in pernicious anaemia secured promotion to Privatdozent in 1913. He began to investigate the dynamics and constituents of CSF and noticed the fluctuations of CSF pressure with respiration. This led to his studies using the Valsalva manoeuvre and jugular compression, published in 1916, during his service in the First World War. He became chief of the Army Medical Services in Harburg near Hamburg. He also wrote about the periostitis of typhoid fever. Ironically, in the final days of conflict, two days before the armistice, he was thrown from a horse while on duty and killed by a passing munitions truck<sup>7</sup> while still a young man.

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