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Historical Review of Paraplegia before 1918

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The first descriptions of spinal cord injuries, which include most interesting comments on management, are found in the Edwin Smith Surgical Papyrus, a remarkable document, now in New York. We are indebted to J. H. Breasted who translated this earliest surviving medical document for the New York Historical Society. The manuscript is dated in the 17th century but is a copy of a much earlier work possibly 1000 years older. This places the date of the original in the age of the pyramids and about 3000 years B.C. This is the time of the great architect and physician, Imhotep, but there is no positive evidence that he, the most famous of all early physicians, was the author. There are some five cases of spinal cord injury in the papyrus of which Case 31 is the most interesting.

Under 'Diagnosis' the ancient physician sums up the case as follows: Thou shoudst say concerning him 'One having a dislocation in a vertebra of his neck while he is unconscious of his two legs and his two arms, and his urine dribbles. An ailment not to be treated.'

For an early picture of a case of spinal cord disease, there is in the Carlsberg Glyptothek in Copenhagen, a funeral stele (dated about 1000 B.C. to 2000 B.C.) of the priest Ruma, who is shown with a shortened leg and atrophied foot, and supporting himself with a cane, this disability being most likely explained by anterior poliomyelitis in childhood. The most magnificent ancient portrayal of spinal cord injury is one of the Assyrian treasures in the British Museum in London. Dated about 500 B.C. and removed from the Palace of Assurbanipal this is a sculpted relief depicting a dying lioness with hind limb and truncal paralysis from an arrow piercing the spinal cord.

Mysticism and superstition begins to give place to a scientific concept of medicine with the writings of Hippocrates (460 to 370 B.C.) who described the serious effect of dislocation of cervical vertebrae. The founder of the subject of human anatomy is considered to be Herophilus of Chalcedon (circa 300 B.C.) who in dissections of the human cadaver traced the peripheral nerves outwards to the skeletal muscles and inwards to the spinal cord and was aware of the distinction between motor and sensory nerves.

As with so many medical subjects the works of Galen of Pergamus (131 to 201 A.D.) contain important observations on the spinal cord. In experiments on spinal cord transections, Galen (reprinted in an extract in 1917), observed that an experimental lesion between the first and second vertebrae caused rapid death, an injury between the third and fourth cervical vertebrae stopped all respiration, whilst if the lesion was made below the sixth cervical vertebra the diaphragm continued to function although the chest muscles were paralysed. He noted that a lesion further down the cord caused paralysis only of the lower limbs and bladder. Galen also made observations on patients with spinal injuries notably gladiators falling from chariots, surely the earliest recorded spinal injuries from road accidents. Aretaeus of Cappadocia (circa 250) was probably aware of the experiments of Galen and made the first profound observations on the crossed functions in the nervous system so that disease on one side of the brain causes paralysis of the other side of the body. He also knew where the tracts crossed and described how 'If, therefore, the commencement of the affection be below the head, such as the membrane of the spinal marrow, the parts which are homonymous and connected with it are paralysed: the right on the right side, the left on the left side.'

Progress in understanding the spinal cord and its disorders was slow in the middle ages, but by the 17th century the accuracy of the ancient medical texts began to be questioned, notably after the discoveries of Harvey (1578 to 1657) who is justly famous above all others, saving Vesalius, as the father of modern medicine. The immense importance of his discovery of the circulation of the blood transcends his other interests, but he also had a profound knowledge of the anatomy and physiology of the nervous system and was the first to separate voluntary motion from involuntary motion and to stress the difference between motor and sensory nerves. He saw many neurological cases and was probably the first to describe clearly a case of syringomyelia. In 1666 appeared the 'Anatome Medullae Spinalis et Nervorum' by the Dutch anatomist Gerard Blasius (1625 to 1692) the first textbook devoted exclusively to the spinal cord. Blasius (1666) distinguished the anterior and posterior nerve roots, the posterior root ganglia and the difference between grey and white matter. He described and illustrated the H shape of the grey matter of the spinal cord in cross section. Niels Stensen (1648 to 1686), a brilliant physician—priest of Copenhagen, in 1671 published his 'Dissertatio de Cerebri Anatome' a most important critical textbook on neuroanatomy. Stensen made the first experiment on the blood supply of the spinal cord when, in a dogfish, he showed that ligation of the aorta caused tail paralysis which recovered when the ligature was loosened.

By the 18th century, separate disciplines in neuroscience were established and there were many advances in neuroanatomy and neurophysiology. The most important figure was Albrecht von Haller (1708 to 1777) of Goettingen, later moving to Bern. Haller illustrated the blood supply of the spinal cord with an accuracy that has still not been surpassed. The specialties of clinical neurology and neuropathology, beginning in the 18th century, and to be greatly expanded in the 19th century, combined in the recognition of many neurological diseases. Giovanni Battista Morgagni (1682 to 1771) the father of pathological anatomy described tumours of the spine and spinal cord and the condition syringomyelia.

The 19th century brought further specialisation and accurate recognition of

many disease states affecting the spinal cord. Robert Carswell (1793 to 1857) and Jean Cruvellier (1791 to 1873) in their atlases of general pathology illustrated spinal cord tumours and the distinctive plaques of multiple sclerosis. Now appeared works specifically on the pathology of diseases of the nervous system notably those by John Cheyne (1777 to 1836), Robert Hooper (1773 to 1835), John Abercrombie (1781 to 1844) and Richard Bright (1789 to 1858). In the second half of the 19th century works were published dealing specifically with the spinal cord and its diseases and a list of some of these authors and the dates of their textbooks includes Mueller, 1871; von Leyden, 1874 and 1876; Stirling, 1876; Tooth, 1889; Bramwell, 1882; Edinger, 1889; Charcot, 1889; Marie, 1892; and Mott, 1895. This demonstrates how large was the sudden expansion of knowledge in this field during 2 decades, not however accompanied with any notable improvement in treatment. This came in the 20th century although the first fruits of neurosurgery appeared in the 19th century. It was in the year 1887 that Sir William Gowers diagnosed an intradural spinal tumour which was successfully removed by Sir Victor Horsley (Gowers and Horsley, 1888).

The treatment of a series of spinal cord lesions inevitably was furthered by the special experience of army surgeons treating battle casualties and the history of progress is found in the medical history of modern wars. In the American Civil War, a very bloody but modern conflict concerning the types of casualties, the treatment of spinal injuries is described by Otis (1870). However, it is in the terrible battles of World War I that we see the modern neurological approach to diagnosis and assessment, but not especially to the treatment of spinal injuries. The medical services of the combatants of the principal nations now had distinguished practitioners of the modern specialty of neurology. The German experience was recorded by Foerster (1929) and the French observations by Claude and Lhermitte (1914–1915) and Roussy and Lhermitte (1918).

We have space here only to quote from the writings of Gordon Holmes (Holmes 1915) who saw many of the British casualties and also performed many autopsies on the fatal cases. His records of over 300 carefully observed cases of spinal injuries recorded during a period of 13 months in the terrible battle conditions in Belgium and France deserve rereading as an example of vital scientific studies recorded under the most adverse conditions. Beginning with the clinical symptomology of spinal injuries he described the features localising the lesion, the changes in reflexes and in reflex tone, and the complex sensory disturbance that may be found. He made very important comments on spinal shock, 'automatic' movements, and sympathetic paralysis leading to hypothermia, hyperpyrexia, polyuria, and marked increases and decrease of the pulse rate. He comments on cases with priapism and the common occurrence of herpes. The emphasis of the work of Holmes and his assistants was always on assessment, which was mainly a neurological diagnosis with anatomical localisation of the part of the nervous system damaged. Long term treatment and the lifetime care of a paraplegic person was not the responsibility of Holmes and his fellow army neurologists. This type of patient care had to await another World War and a new specialty of paraplegic care created by the late Sir Ludwig Guttmann.

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