Intracranial Hemorrhage in the Seventeenth Century
A Reappraisal of Johann Jacob Wepfer's Contribution Regarding Subdural Hematoma

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SCHAFFHAUSEN, situated on the Rhine river in Northern Switzerland, although a small town, has produced over the centuries a number of outstanding scientists. Three hundred years ago it was the home of two eminent physicians, Johann Conrad Peyer, and Johann Jacob Wepfer. Both men are still well remembered, Peyer as the discoverer of the lymphatic nodules now called Peyer's patches, and Wepfer, the subject of this communication, known to pathologists and neurosurgeons as the author of the first report of a chronic subdural hematoma. Cases of acute traumatic subdural hemorrhage had been reported earlier, for example by Ambroise Paré. The case of Wepfer's which has become a "classic" was presented in a now equally classical paper by Putnam and Cushing on chronic subdural hematoma as follows:

"In 1656 Johannes Wepfer performed a necropsy on a patient of seventy who died some hours after an 'apoplectic' stroke, with aphasia and hemiplegia. He was assisted at the postmortem by Harderus. A bloody cyst, about the size of a hen's egg, was found beneath the dura. He believed that he could demonstrate multiple ruptures of the meningeal artery."

Putnam and Cushing then continue with discussion of other early reports of this condition in the literature, and state in a footnote:

"These earlier reviews do not apply the rigid criticism that seems necessary nowadays to the cases reported in them. . . . Few of the early histories can be accepted without reserve. . . ."

Ironically, as we shall see, a similar statement must be attached to part of their own work.

In the course of recent investigations related to the history of intracranial hemorrhage it appeared worthwhile to take recourse to some of the actual sources of early reports. The case quoted by Putnam and Cushing, and requested again and again since their paper appeared in 1925, was taken from Wepfer's book, "Observationes Anatomicae ex Cadaveribus eorum quos sustulit Apoplexia." The first edition was published in Schaffhausen, in 1658; a second appeared in 1675. So little has the original text apparently been consulted, that, by 1939 in a German report on subdural hematoma, Wepfer's patient who actually, as we shall see, was a woman, had become a man! A few years ago this same "old man" with the "bloody cyst under the dura" again appeared in a publication from the University of Zurich, not thirty miles from Schaffhausen. A more thorough scrutiny of Wepfer's book reveals a different picture.

The patient in question, reported in case history No. 2 (page 5 in the edition of 1675) was a woman, an approximately 70-year-old widow named Barbara Zuberin. When she was taken to the hospital, she had never been seriously ill before, but had had slight diminution of vision over the previous few years. For several months, however, "prodromi" of apoplexy had been noted by others, including sudden episodes of difficulty with speech. In Wepfer's own words, translated from the Latin with some omissions:

"On January 29, 1637, at three in the afternoon, in the presence of friends, she was apparently well and engaged in spinning, when suddenly she lost her speech and collapsed. She was put to bed. It was noted that she moved the right leg and lifted her right hand to her head, trying to say something which was, however, unintelligible. Immediately she lost all senses and motions and only pulse and respiration continued, the latter becoming stertorous. The face was reddened. Since she could not swallow, no medications were given. She died at six o'clock on the same evening."

"On the following day I performed an autopsy assisted by my eminent colleague, Dr. Harder. I opened the skull, cut the dura meninx in circular fashion, then the falx at its attachment at the crista galli, and dissected the lateral sinuses."

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(Wepfer here undoubtedly implies the cutting of the tentorium.)

"I then inclined the brain sideways, cut all pairs of nerves, the carotid arteries near the infundibulum, the infundibulum itself, and the vertebral arteries where they emerge in the occiput, and finally the medulla oblongata at the foramen magnum, and having released the brain by this procedure from all attachments, extracted it in toto in order to delve deeper into the cause of this sudden demise."

"After taking out the brain, I lifted up the dura which was still covering it. The right side of the brain superiorly and posteriorly, but, not quite as far down as the base, was found suffused with blood all over. The brain itself was soft, and one could manifestly feel to the touch some fluctuation inside. The brain on this side, upon removal, showed a cleft out of which there emanated clots of very dark blood in an amount about the size of a nutmeg. After gently inserting my finger into this cleft I then enlarged it with the knife. I found a large cavity reaching forward almost to the front, backward to beyond the half mark of the brain, upward toward the falx and equally so downward. This space contained a clot of blood the size of a hen's egg, besides smaller clots and liquid blood, the total amounting to about eight ounces. At first we believed that this was the lateral ventricle, but after a more exact search we found that this was not the lateral ventricle, but a peculiar cavity formed by extra-vasated blood, resulting from some ruptured branch of the important anterior ramus of the carotid artery, which, after it passes the optic nerves in the anterior and lateral part of the brain, enters into a remarkable convolution and, not far from its origin, divides into many branches which enter between all the midline convolutions of the brain and continue upward along the median gyrus and sulci to the falx, dividing into many very small branches. Of these branches many, and in many places, enter the substance of the brain. And we could indeed clearly, and without doubt, recognise that one or more branches of this artery were ruptured in this area. . . . Following the rupture of one or the other of these arteries, the blood poured out of one of the deeper convolutions with the arrival of more and more fresh blood, much as wave is driven upon wave; thus the space of the fissure was more and more dilated and easily grew to great magnitude, just as it occurs in the case of an aneurysm, except that in the brain, because of its softness, such a cavity will be formed more quickly than in any other part of the body."

"The surface of the convolutions above was intact, held together by the pia, and neither was the base of this cavity broken, as a result of the existence of the roof, or fornix of the right ventricle, which is richer in fibres and more tenacious than the interspace between the gyri. . . . In the entire space which lies between the dura and pia meninx there was no fluid anywhere, not even any at the base or occiput. The right ventricle was intact and contained hardly as much slightly bloody serum as one-half of a walnut's shell. The left ventricle was empty. In the third we found a clot of blood of pea size. In the left half of the brain no abnormality was noted. Therefore, this aneurysm appeared to be sufficient cause to explain this severe apoplexy. . . ."

So much for Wepfer's report on this case. There is nothing to be found here of a "bloody cyst" under the dura which, centuries later, when Wepfer is quoted, appears repeatedly among various authors. There is nothing in this text to indicate, as has been quoted later, that Wepfer had demonstrated "rupture of the meningeal artery." In fact, Wepfer's words make it quite unmistakable that he demonstrated rupture of one or more branches of the anterior cerebral artery. Elsewhere in the same book Wepfer makes a specific point of demonstrating that the internal carotid arteries send no branches at all to supply the dura mater as had been the belief among anatomists before him, and in the description of the case above he leaves no doubt that the ruptured vessels which he found were branches of the anterior cerebral artery.

It therefore remains a mystery as to how the case of Barbara Zuberin came to be considered an example of subdural hematoma rather than of an extensive intracerebral hemorrhage from rupture of a branch or branches of the anterior cerebral artery.

It seems, therefore, that Wepfer has been misquoted for at least three generations. So far, I have been unable to trace this misquotation further back than Putnam and Cushing's paper, or to determine their source of information about Wepfer's case. They quote Wepfer directly but obviously did not consult the original.

However, there still remains no reason to deprive this eminent physician and pathologist of the honor of having given us the first description of a chronic subdural hematoma. Further detailed study of his "Observationes Anatomicae" reveal among nu-
merous fascinating reports at least two case histories which clearly represent patients suffering from this condition.

The first is case No. 4, on page 15 of the edition of 1675.

"Jacob Reutinger, about fifty years old, verging in his temper toward hot and dry, of dusky complexion, fleshy habitus of body, with dark curly hair but balding early. . . . He was rather poor and was accustomed to hard manual work, mostly employed in the vineyards. He was very fond of the gift of Bacchus and not seldom used to moisten his chest, hot from hard work, with undiluted wine. It was not possible to elicit any important illnesses in his earlier life. As far as I could find out he had, for the last few months past, been plagued with severe cardiac pains. For this reason he consulted me, and these complaints then disappeared after some medication, but returned shortly thereafter because of his unreasonable way of life, hunger and poverty also contributing to this. Not satisfied with my treatment he even consulted the hangman (because, in this region, such people also practice some kind of medicine), and I found out without difficulty that he did not abstain from benedictions, as they are popularly called, but which should properly be called incantations or sorcery, to which, like to a sacred anchorage, the dregs of the population often take refuge, so that one can rarely dissuade them successfully from this abominable impiety."

"A few weeks before his death, a most cruel headache began to affect his entire head, especially the front and the occiput, from which he was given neither relief nor rest. He loathed all types of medication. However, some external applications were made, upon feminine persuasion."

"Because of this pain he was at times out of his mind so that he often did not remember whatever he said or did. Three weeks before death he became totally blind, whereas there was no external damage to either eye. The ferocity of his headache then relented for a while but there remained a certain fear or anxiety because of which he used to thrash his body around and he could not reveal to us, no doubt because he was sick of mind, the cause of his wallowing in bed. Fourteen days before the fatal day he began wetting the bed. A few days later this calamity was followed by another one; a paralysis, namely of the right leg, soon followed by one of the left."

"Four days before death he was struck by a severe apoplexy, where he lay prostrate without any animated senses or motions, and could not be aroused by any manoeuvre."

"During all these days he showed profuse perspiration and had stertorous breathing continuously. While lying in bed he was afebrile."

"On the eleventh day of February, eleven days before the full moon in the year 1656, he exchanged life with death. The following day I opened the cranium. After opening the dura mater there exuded a pale serum the color of a grain of corn, and with a certain impetus, not unlike the blood erupts from the sectioned vena mediana of the arm, and indeed in such an amount that a ladle holding several ounces could be filled with it. This serum appeared to be accumulated mostly in the space which lies between the dura and pia mater which appeared to me wider and more voluminous than it exists usually in its natural state, whereby the serum, in its excessive amount, distended the dura mater everywhere where it did not meet an obstacle and depressed the cerebrum and cerebellum.

"Even between the pia mater and the cerebrum and cerebellum much serum was contained so that the entire surface of the cerebrum and cerebellum, the gyri as well as the large fissures, after these were opened, appeared covered with something like a kind of gelatin which, when cut with the knife, drained off pure serum quite similar to the one accumulated between the dura and pia mater. We could also recognise that in the depths, the substance of the cerebrum and cerebellum were imbued with serum because both were exceedingly soft and flaccid. The whole surface of the brain was pale, the blood vessels, however, not all emptied. After cutting away a section of the brain, rare bloody spots were seen sprouting from the cut surface. In all ventricles too there was abundant serum. I saw no mucus which could have obstructed the opening or canal from the third to the fourth ventricle. After dividing the medulla oblongata at the foramen magnum and lifting out the brain, much fluid came out of that opening so that I have no doubt that the cystern too, was filled with it completely."

"I would have liked to examine also the condition of the remaining organs, but neither by prayers nor offers of money could I obtain permission from the wife and relatives of the deceased. Out of some superstition most of our countrymen are of the opinion that human cadavers are subject to certain insult when they are dissected for the purpose of helping other ailing people, whereas otherwise they in a short time become the victuals of worms."

A second similar case is found on page 370 of the edition of 1675.

"Jacob Spoerlin, in his seventies, pale, thin, strong, was a cooper second to none in industry, skill and speed in his work. He was stronger than many while a young man and not easily gave in to anybody while an old man. For some time he had
been a merchant selling spirits and other wares in the towns, and for these reasons faced frequent dangers and often on his trips had suffered injuries from storms. Several years before he had been imprisoned for reasons not known to me. There he lived in darkness and squalor for over twelve years. Finally, through the intercession of our supreme magistrate he was set free and taken to our hospital."

"When he arrived there he was cachectic, with pale face and lips. He had oedema of the feet, his limbs were all weak, and he had an ulcer over the right tibia, draining yellow fluid continuously and very painful so that he was sleepless for many nights. Thereafter, with fresher air, better nourishment and proper medications, cachexia and oedema gradually disappeared. He resumed his previous strenuous work and showed a hardly imitable skill in manufacturing small barrels. In the morning he sometimes suffered from vomiting watery fluid before eating breakfast; this was sometimes bilious and not without violence. He had some precordial pain almost constantly. There was also a steady headache occasionally accompanied by vertigo. In the last year of his life he suffered from early morning cough with production of purulent sputum. A few weeks before his death he suffered from catarrh and feelings of suffocation. He developed a slow fever and lost weight, and shortly before death became so invalid that he had to be turned in bed."

"In the last few months he suffered from pains in both thighs. Shortly before death he spoke and asked to be turned, immobilized by weakness."

"On May 10, 1657, Harder and I opened the body. . . ."

There follows a description of the autopsy concerning the abdomen and thorax, no abnormalities being found except in the lungs which showed some small cavities, irregular in shape.

Wepfer then continues:

"After removing the calvarium, and upon sectioning the dura, a great deal of slightly pale serum escaped, which had been contained in the space between the two meninges, but not in such an amount as I found in the case of Reutinger, since here the space was narrower. The whole surface of the gyri and sulci was covered with a kind of gelatin from which, after it was cut with the knife, water exuded. Of this serum we also found much in all ventricles. The consistency of the brain was soft and flaccid; less, however, than in the case of the above-mentioned Reutinger, and we did not find it collapsed or compressed."

In the 'scholium' following the presentation of this case, Wepfer states that it did not seem to fit too well into the category of typical apoplexy, but that he felt it should be mentioned since the patient's symptoms, of which he quotes headache, some transient paresis and vertigo, indicated to Wepfer that the disease affected the functions of the nervous system.

Without any doubt, these two case histories from Wepfer's "Observationes" described chronic subdural hematomas. It is surprising that they have not been quoted before, particularly where Wepfer's observations on subdural hematoma have been considered. Instead, somewhere in the distant past there originated the misquotation of the first case described in this paper which subsequently has been handed down in its distorted form. One may well ask how many medical authors and historians have personally consulted Wepfer's original description.

I hope that this presentation will correct a long-standing historical and bibliographical error, giving Wepfer credit for what he really reported and thereby further enhancing the importance of his career as a physician and scientist.

References