CASE OF COMPOUND FRACTURE OF THE
SKULL, WITH RECOVERY.

*Abscess of the Brain.—Hernia Cerebri.—Paralysis.—
Remarkable Discharge of Serum.—Loss of Speech.*

BY EDWIN HUTCHINSON, M. D., UTICA, N. Y.

On the afternoon of February 26th, 1868, a son of Christian Galli, of Utica, aged three years and eight months, fell down stairs, striking his head with great force against the corner of a stove. He was not made insensible by the blow, but screamed loudly as they carried him into the house. I saw him about an hour after the accident, and found him sitting on his mother's knee, intelligent, and making no complaint of pain; his skin cool, pulse moderate, and little to indicate that he had sustained a serious injury. On removing the cloth which covered his forehead, to my surprise, a mass of brain matter was noticed filling the wound in the scalp. The skull was fractured at the anterior portion of the right parietal bone.

In order to make a careful examination, I placed him under the influence of chloroform, and made a V incision down to the bone. The opening in the skull was a little more than one inch in diameter. A piece of bone about as large as a copper cent, had been driven in like a hinge, so that it remained at right angles to the surface. The lower edge could be plainly felt with the finger, and it was found that it had been forced down through all the coverings into the substance of the brain itself. The inner table was not much splintered, and but few loose pieces were removed. A small place was now cut away from the anterior edge of the opening to

make room for the elevator; this instrument was used, and the depressed bone restored as nearly as possible to its former position. An ounce of brain-substance was lost during the operation; very little blood escaped. The edges of the wound were brought together with adhesive straps, water dressing applied, and the child put to bed. He was quite bright after the effects of the anæsthetic had passed off.

The following is a brief summary of the subsequent history of the case:

February 27th, child doing well; wound kept constantly wet with solution of carbolic acid, one grain to the ounce. 28th, head cool; pulse moderate; appetite good; eyes natural, pupils not contracted; bowels have moved; wound nearly united by first intention. 29th, pulse 120. March 1st, pulse 120; slept well last night; everything favorable. 2d, pulse 128. 3d, pulse 132; ordered cathartic. 4th, pulse 140; restless. 5th, pulse 140; head hot; cold water applied; still quite restless; healthy pus discharging from wound. 6th, 7.30 A. M., pulse 132; he passed a restless night. The membranes forced themselves through the fissure in the skull, and stopped the flow of pus; they were cut away with scissors, and then a probe introduced about an inch; at first some serum escaped, and then over a drachm of healthy pus, together with some disorganised brain matter; there was some bleeding. Child slept while probe was used; pulse the same after probing; order wine, milk and beef tea freely. 5 P. M., pulse 128. 7th, 9.30 A. M., pulse 128; patient bright, pupils natural. The rapid pulse, and general irritation caused by the retention of matters within the skull, ceased as soon as the passage was opened for their discharge. 3 P. M., pulse 132 while awake, 116 sleeping; during the day a teaspoonful of pus escaped suddenly. 8th, 9 A. M., pulse 110. 9th, pulse 120; a tablespoonful

of pus gushed out, with a little blood. There is evidently quite an abscess in the brain with defined walls; the membranes protruding into the opening left in the skull, block it up so that the pus cannot be discharged; by probing every day deeply, exit has been given, and the brain relieved from pressure. There is now considerable cerebral disturbance; his eyeballs twitch rapidly and regularly from side to side. Order cathartic. 5.30 P. M., pulse 124; pus now discharges freely; bowels still constipated; repeat cathartic; eyes twitching as before; cerebral irritation continues. 10th, 8.30 A. M., pulse 114; eyes do not move so rapidly; bowels still constipated; repeat cathartic. 5 P. M., pulse 112 while sleeping; very little discharge from wound; eyes twitching regularly; bowels moved. Left arm paralyzed, and colder than right one; order bromide of potassium, two grains every two hours. 11th, pulse 112 awake, 100 asleep; very irregular. Passed a probe two inches, pressed aside the membranes, and allowed the escape of considerable dark colored pus. Skin cool; tongue moist; bowels have moved freely; child now screams constantly. 8 P. M., pulse 104; eyes move slightly; some discharge from wound; arm still paralyzed. 12th, 8.30 A. M., pulse 98 and regular; he moves his left arm, which is somewhat warmer. His eyeballs are now quiet and natural; the twitching has continued four days; the wound discharges more freely; continue bromide of potassium. 5 P. M., pulse 90 while sleeping; considerable pus flowed during the day; left arm again completely paralyzed. 13th, pulse 112 while awake; has a brighter expression, and better appetite; arm still paralyzed; bowels constipated; ordered castor oil. 14th, pulse 112; seems much better; can move his left arm; the paralysis has continued nearly five days; appetite improving; bowels have moved. 15th, pulse 116; has greater use of arm; 16th, pulse 112; is brighter.

18th, pulse 96 while sleeping, 116 while awake. The membranes and disorganized brain matter have now protruded themselves through the opening, even forcing the fragment downward and backward; thus far I have kept the mass constantly cut away with scissors. It grows rapidly, pulsates regularly, and is a real fungus or *hernia cerebri*. 19th, pulse 120; sleeps well; the hernia is about the size of a filbert, and is cut away. 20th, pulse 112. 21st, pulse 106; he worries considerably, and is constipated; ordered castor oil. 22d, pulse 104; hernia is again cut away; appetite excellent; bowels regular; sleeps well. The power of speech has been seriously affected; now says a few words; enjoys his playthings and is intelligent. 23d, pulse 104. After cutting off tumor, passed a probe deeply into cranium, and considerable serum escaped; this came undoubtedly from effusion following sub-acute inflammation of the serous lining of the ventricles. 25th, hernia protrudes slightly. 29th, pulse 112. Tumor pulsating regularly, and is as large as a pigeon's egg; is sliced off, but not to the bone; hemorrhage considerable; controlled with persulphate of iron. 30th, tumor three quarters the size of a hen's egg; child resisting the operation, was put under the influence of chloroform, and the mass cut away nearly to the bone; hemorrhage very severe, and controlled as before; pulse 120 after operation; the child perfectly intelligent. 31st, pulse 128; hernia grown rapidly since yesterday; applied solid nitrate of silver; general appearance good.

April 1st, pulse 120; tumor increasing; again applied the caustic. 3d, pulse 132 and feeble; tumor larger than a hen's egg, and composed of disorganized brain matter, coagulated blood and lymph; applied pressure with a bandage. 4th, pulse 140; remove bandage. He tore off a piece of the fungus as large as a walnut during his

sleep, and it bled freely; the father stopped hemorrhage with some persulphate of iron I had left in the house. 5th, pulse 148; in the afternoon nearly two ounces of healthy pus escaped suddenly from cranium. Since April 1st, his pulse has been steadily increasing, and he has shown signs of considerable irritation. 6th, pulse down to 128; patient much better.

7th, pulse 134; pus does not flow; talks and appears bright. 9th, pulse 128; tumor larger. 11th, hernia about the size of a hen's egg; tied it off with a silk ligature; bleeding stopped with persulphate of iron and snow. 12th, pulse 140; tumor grows almost as fast as it is cut away. 13th, pulse 120 while sleeping; restless when awake. 15th, pulse 144; tumor increasing; he is constantly fretful; bowels constipated; to have castor oil. In the evening a discharge of serum commenced from the wound, and continued until the 20th. The cloths on his head were constantly saturated with the fluid, although frequently renewed. His pulse became less rapid, and he appeared decidedly better as soon as the flow of serum began; the discharge was profuse, dropping rapidly from the wound when the head was inclined. 21st, pulse 134; the flow of serum ceased; about thirty ounces of liquid have been discharged during the last five days; he has a good appetite, but is fretful.

24th, pulse 140. Hernia has not grown since the 15th, when the serum commenced to discharge, proving conclusively, that this singular pathological formation, is not merely a mass of exuberant granulations, but that it is brain-matter more or less disorganized, with clotted blood, forced out by effusion within. The tumor is now firm, has a pink surface, and does not pulsate. He has been deaf for the past ten days; continue the bromide of potassium. 26th, pulse 128; tumor unchanged; patient

now able to walk a short distance when assisted, but reels when unsupported. May 4th, pulse 130; patient improving; tumor smaller. 8th, is strong, and walks easily though unsteadily. 9th. The discharge having ceased, pressure was now applied over the hernia, a hemispherical cork pad being used, with a band of rubber webbing. 11th, the tumor is nearly reduced; he still walks unsteadily. 14th, the cork pad was made more conical, so as to press the hernia into the skull, without preventing the scalp from growing over the wound; the rubber band answers well. 26th, the hernia is pressed in as far as possible, and the scalp is healing over the tumor; the boy now talks, hears, plays, and acts as well as he did before the injury, and one would scarcely credit that he had received such a wound. 30th, scalp heals slowly. June 5th, his parents took him to Montgomery County, and a few days afterwards he became perfectly deaf; he passed under the care of Dr. Morgan Synder, of Fort Plain, who wrote me June 19th, that the boy was entirely well excepting the deafness; the scalp had grown over the wound, and although the scar was impressible, and pulsated slightly, yet it was firm. His father has just informed me that the boy is still perfectly deaf, but otherwise, as healthy as could be desired.

There are many points of interest in the case just reported. In the first place, we notice that the child was not stunned by the fall, although the blow was sufficient to fracture his skull; he did not even suffer from the shock. It was providential that he escaped the dangerous symptoms which usually follow such injuries, and often herald an unfortunate result. A few days after the accident, the pulse became more frequent, the skin somewhat warmer, and the head hot. Everything indicated the formation of an abscess, and soon healthy pus made its appearance. So long as the wound discharged freely, the

symptoms were favorable, but the protrusion of the membranes into the opening in the skull, so often alluded to, made it necessary to introduce the probe. If the discharge was interrupted, the frequent pulse and restlessness would show at once the danger; after the probe was used, the relief was marked and immediate. The abscess had regularly defined walls, and burrowed downwards and backwards. This is proved by the fact that there were no signs of diffused abscess, and at length, the discharge of serum made it evident that there was some inflammation of the ventricular lining.

The paralysis was unquestionably due to pressure from effusion. As has just been intimated, there was sub-acute inflammation of the serous lining of the right ventricle, which being distended with fluid, pressing on the base of the brain, the result was paralysis of the opposite side.

The hernia was at first formed by the diseased arachnoid and pia mater. Afterwards, when the flow of pus had ceased, and the abscess was empty, the granulations from the brain made up considerable of its bulk. Finally, the capillaries which supplied it gave way, and blood clots and brain matter were mingled together. When the tumor was small it was quite firm, but afterwards it became soft, and could be easily torn. It will be noticed that at three separate times the growth increased rapidly, becoming as large as a hen's egg in twenty-four hours. This was not the result of the granulations, but was invariably caused by the accumulation of either pus or serous effusion within. This was the case on the 25th of March, and on the 5th and 15th of April. The tumor ceased growing the moment the flow of serum began, which proves conclusively that it was being forced out by the effusion.

It was good surgery, though not often recommended,

not to attempt to reduce the mass by pressure, so long as there were signs of inflammatory action within. When these signs disappeared, the rubber band was applied with success. It was often necessary to cut the tumor away to give a free place for discharge, and also, when the fungus was soft, to prevent the restless patient from tearing off a large portion, and so suffer from hemorrhage. The scissors was the best means used for this purpose; caustic and ligature were unsatisfactory.

A very remarkable feature, was the five days flow of clear serum. The quantity could not be accurately determined, but was very great. He passed but little urine during this period. The serum unquestionably came from the ventricles. Had pressure been used at this time the boy's life would have been sacrificed.

This adds another to the list of cases of considerable loss of brain substance, without the loss of intellection. The original injury, with subsequent abscess and hernia, made a very great deficiency in the original size of the anterior portion of the right hemisphere. To-day no evil results are seen from this cause. He is perfectly deaf, probably from some injury to the auditory nerve by pressure, or by its being implicated in the changes brought on by inflammation. As the deafness is total, it is likely that the lesion exists near the origin of this nerve, on the floor of the fourth ventricle.

The partial loss of speech for a time, would seem to indicate some change in the left hemisphere; the accumulation of fluid in the left lateral ventricle from the right through the foramen of Munro, bringing on the pressure which caused the aphasia. Still, is this not going out of the way to support a theory? A number of cases have been reported of this condition, where the pathological change has been upon the right side altogether, as found after death. As the wound re-

ceived by this child was upon the right side, it does not coincide with the theory of M. Broca and his supporters.

For two months the boy could not walk alone, although he was quite strong and had gained flesh rapidly. He could easily stand up if assisted, but could not take a step forward, or balance himself. This dizziness was neither caused by great debility or anemia. It was too marked from the first, and lasted too long. In fact he did not recover from it for nearly four months. The reason for this is to be found in the unusual disturbance in the secretion of the cerebro-spinal fluid. It will be remembered that there is a communication between the sac of the spinal arachnoid and the ventricles. When from any cause the relation of the liquid contents of the brain or cord is made greater or less than natural, vertigo is the result. Here we find an unusual accumulation of serum in the ventricles, giving rise to various alarming symptoms, and even forcing a passage for its external discharge. The serous surfaces which gave up this secretion could not resume their healthy state rapidly, and no doubt kept the cerebral cavities distended sufficiently to occasion the vertigo.