

immunized, therefore the disease progresses. The only way to confer immunity on the higher nerve centres is to inject the antitoxin into the substance of the brain.

Chauffard and Quenin, of Paris, were the first to adopt Roux and Borrel's method of intracerebral injection of tetanus antitoxin in a case of tetanus in man, in April, 1898. The case recovered. Over twenty cases have been treated in this way in and near Paris since that time, with encouraging results. Dr. Semple does not state how many recovered.

In Dr. Semple's case, on November 16th, the patient developed symptoms of tetanus. The masseter muscles and the muscles of the neck were contracted, and those of the abdomen slightly so. On the 17th spasm of the jaw muscles was marked, and there were also spasms of the muscles of the legs and arms. On the 17th at 9 p.m., $2\frac{1}{2}$ c.cm. of doubly strong antitetanic serum were injected into each frontal lobe of the brain, and 20 c.cm. of antitoxin were injected by hypodermic into the flank. On the 18th the condition was unchanged, and 20 c.cm. were given hypodermically; on the 19th the condition was about the same, and 20 c.cm. were given hypodermically; on the 20th the spasms were less marked; on the 21st there was more improvement; on the 22nd he could open his mouth without causing spasm; on the 23rd the muscles of the jaw and neck were free from spasm, but there were twitchings when he heard a noise; on the 30th he was able to be out of bed, but had slight spasm of the arms on exertion. He was weak and anemic. He had no brain symptoms, ate and slept well. The temperature was practically normal throughout, and pulse and respiration regular.

The intracerebral injection immunizes the higher nerve centres before the toxin has become fixed in the nerve cells. Twenty c.cm. are given hypodermically for two, three or four days, according to circumstances, and have the effect of rendering the blood antitoxic. The toxin, therefore, as it becomes absorbed from the source of supply, is neutralized as soon as it reaches the blood stream.

Description of the Operation.—The hair is cut, the anterior part of the scalp shaved and the skin made aseptic. The patient is anesthetized. An imaginary line is drawn from one auditory meatus to the other; another line from the base of the nose intersects this at right angles, and a third from the outer angle of the orbit to the point where the first two lines intersect. The middle point of this last line is chosen as the site of operation. An incision from $\frac{1}{2}$ to $\frac{3}{4}$ of an inch is made down to the bone. A small hole is drilled with an Archimedean drill, with a movable collar, so as to regulate the depth to which it