THOSE WERE THE DAYS…

Dr. Karl Koller looked in the mirror and proceeded to poke himself in the eye with the head of a pin. He felt nothing! The cocaine solution he had dripped into his eye that day in 1884 had clearly done its job! More than that, the experiment would prove to be the springboard for a giant leap in medicine.

Koller was an ophthalmologist and colleague of Sigmund Freud at the Vienna General Hospital. Freud, who of course would go on to fame as the father of psychoanalysis, had become interested in studying cocaine as a possible treatment for morphine addiction and enlisted Koller as a collaborator. Since Koller specialized in eye surgery, his interest was drawn to an effect that had first been noted by South American natives who chewed the leaves of the coca plant for its stimulant effect. Cocaine, they found, numbed the tongue! Could it do the same to the eye, Koller wondered?

An experiment with a frog proved to be successful and prompted Koller to undertake the classic experiment on his own eye. He made his discovery public at a meeting of the German Ophthalmological Society in September of 1884, precipitating the widespread use of cocaine as an anesthetic in eye surgery. A report of that meeting caught the eye of Dr. William Halsted, an American surgeon practicing in New York.

Halsted had already garnered a degree of fame for performing a gall bladder operation on his mother in the middle of the night on the kitchen table, and for giving his sister a transfusion of his own blood when she was on the verge of death from blood loss after giving birth. Having a doctor in the family sure is useful.

If cocaine could numb the eye, it might have a similar effect elsewhere as well, Halsted thought. Like Koller, he became his own guinea pig and found that an injection of cocaine produced safe and effective local anesthesia. But he also experienced some of the other classic effects of cocaine and became addicted to the drug. It took a stay at a Sanatorium to beat the habit.

Halsted went on to a brilliant surgical career at Johns Hopkins University School of Medicine where, besides the use of local anesthetics, he introduced various antiseptic techniques, including latex gloves for surgeons. He devised ingenious procedures for breast cancer and aneurysm repair, and is credited with starting the first formal surgical residency training program in the U.S.

Like Halsted, the American neurologist James Leonard Corning heard about Koller's report. His thinking, though, took a different direction. Corning knew that injecting strychnine into the spinal cord of a frog caused the animal to go into violent spasms. Now he wondered if cocaine, with its demonstrated numbing effect on nerves, could have a therapeutic potential if injected into the spinal cord. Corning wasn't foolhardy enough to try this on himself, but he did inject a dog.

Within minutes the animal's hind legs became discoordinated, and as far as Corning could tell, insensitive to pain. He didn't hesitate in putting this observation to use and injected a patient who suffered from "spinal weakness" with his cocaine solution. He was gratified to see the appearance of anesthesia in the lower extremities. In 1885 his report of the case appeared in the New York Medical Journal, concluding with the

statement: “Whether the method will ever find application as a substitute for etherization in surgery, further experience alone can show.”

That experience came in 1898 in the hands of August Bier, a young surgeon at the Royal Surgical Clinic in Kiel, Germany. By this time general anesthesia with ether or chloroform was widely practiced, but came with a slew of problems. Dosages were hard to control and side effects such as headaches and vomiting were common. Corning’s preliminary experiments with cocaine seemed worthy of pursuit. Since there were no ethics committees in those days to worry about, Bier proceeded. In a series of six cases, he injected cocaine into the cerebrospinal fluid before surgery for infections of the bones, his specialty. The results were excellent, the patients complained of no pain. But they did complain of major headaches after. Bier wasn’t sure how seriously he should take these complaints, and as he later wrote, “To arrive at a valid opinion, I decided to conduct an experiment on my own body.” That did not turn out to be a happy experience.

A colleague, Dr. August Hildebrandt, agreed to help. The plan was for Hildebrand to perform a lumbar puncture with a large needle, and then attach a cocaine-filled syringe. Unfortunately, preparations had been less than meticulous and when Hildebrandt tried to attach the syringe he found it didn’t fit. As he fumbled around, Bier’s cerebrospinal fluid began to squirt out and a horrified Hildebrandt plugged the hole with a piece of collodion. Gallantly taking blame for the botched procedure, Hildebrandt now volunteered his own spine for the experiment. No one would accuse these two of being spineless.

After carefully checking the needles, they pushed on. Within minutes Hildebrandt’s legs were anesthetized. Stabbing with a needle elicited no response, neither did the stubbing out of a cigar on his leg. To investigate the extent of the anesthesia, Bier pulled out chest hairs and pubic hairs. Tugging on the chest hairs, but not the pubic hairs, caused pain. Finally, Bier gave Hildebrandt’s testicles a sharp tug and then stabbed his thigh right to the bone. No pain!

The two celebrated with wine and cigars, but, as it turned out, a bit too soon. Both developed splitting headaches the next day, a common symptom of loss of cerebrospinal fluid. However, they had demonstrated that surgery could be performed under spinal anesthesia and that side effects could be minimized if loss of cerebrospinal fluid was prevented. Spinal anesthesia proved to be safer than general, and within two years was commonly used around the world. Cocaine has since been replaced by a variety of other drugs, but it still holds a place of honour as the substance that triggered the march towards successful local and spinal anesthesia. And it all started with a poke in the eye.