MICROSURGERY

Surgery under the microscope has dramatically improved neurosurgery and is starting to benefit other areas of surgery

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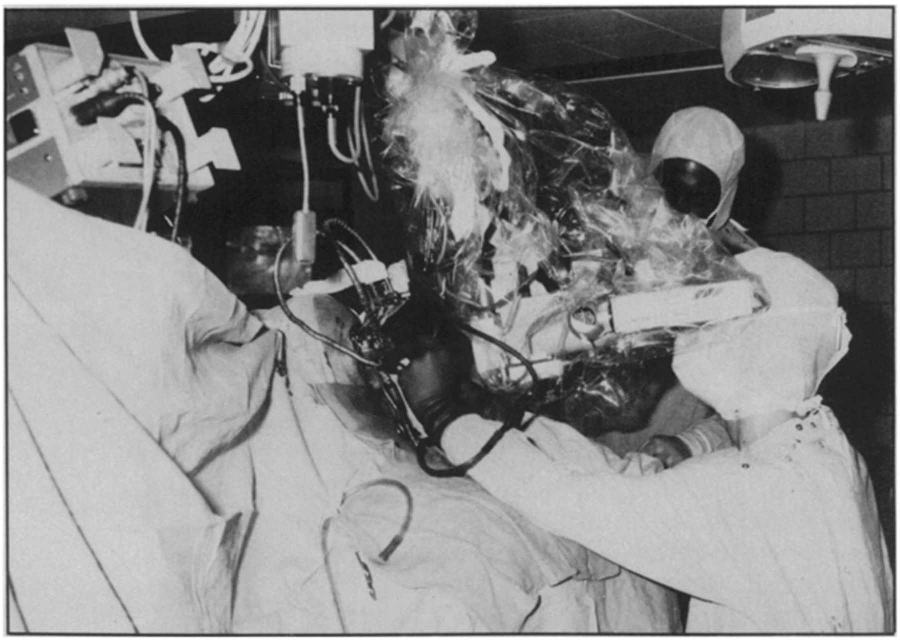
Johns Hopkins

Johns Hopkins surgeons use a microscope to remove a tumor from a patient's skull.

On March 5, a 55-year-old Baltimore woman, whom we'll call Leila M., experienced excruciatingly severe headaches, a stiff neck and weakness in her arms and legs. She took a cab to the emergency department of Johns Hopkins Medical Institutions, and the cause of her problems was soon diagnosed. She had an aneurysm (weakness) in an artery in her brain. The aneurysm had bubbled out and was leaking blood. Leila was lucky; Fifty percent of patients with hemorrhaging brain aneurysms die before they even make it to the hospital.

The challenge, though, was to get at the aneurysm in Leila's brain and to clip it before it had bled enough to kill her. What's more, Leila's aneurysm was especially dangerous because it was at the base of her brain in the basilar artery, an artery that cannot be sacrificed without also sacrificing a patient. The artery is also extremely tough to reach surgically.

On the afternoon of March 12, Johns Hopkins neurosurgeon Melvin Epstein, with other neurosurgeons and medical staff assisting, opened Leila's brain and surveyed it under a high-powered microscope that magnified blood vessels and other brain structures to 20 times their actual size. Epstein then proceeded, while looking through a microscope, to zero in on the aneurysm with a tiny titanium clip.

The operating room became ominously silent. If Epstein clipped the pea-sized aneurysm at its head, rather than its neck, it could start bleeding profusely and kill Leila. Or if Epstein clipped Leila's basilar artery instead of the neck of the aneurysm, it could give Leila a stroke and paralyze her for life. But Epstein deftly clipped the aneurysm where he was supposed to — at its neck — then pricked the aneurysm to collapse it. Leila was then sewn up with the clip remaining inside. The operation was a success. Leila's basilar artery could now continue to shunt blood to her brain without danger of leakage. Studies have shown that titanium clips left in patients have no adverse effects. Leila could expect not only to live, but to live a normal life.

Surgery conducted under the microscope — microsurgery — thus appears to enormously benefit patients with brain aneurysms. Scientific evidence, in fact, that this is the case comes from a study recently completed by Epstein, Johns Hopkins neurosurgeon Lyal Leibrock and Johns Hopkins neurosurgery chairman Donlin Long (submitted to the JOURNAL OF NEUROSURGERY). They compared the outcomes of expertly performed microsurgery on brain aneurysms with the outcomes of direct visual surgery and found that whereas patients with the former have a 90 percent chance of leaving the hospital a normal person, the latter only have a 50 percent chance. "Few things in medicine in the recent past have had that kind of impact on mortality," Long says.

Microsurgery is benefiting neurosurgery in other ways, too, since it allows surgeons to work with precision unobtainable through conventional neurosurgery. Neurosurgeons can now sew injured peripheral nerves together and even help them recover function; with conventional neurosurgery, such nerves have only a 20 percent chance of regaining function. With the help of the microscope, neurosurgeons can untangle blood vessels tangled in the spinal cord; before, such vessels were untreatable. Thanks to the microscope, neurosurgeons can remove benign tumors from outside the brain or from the spinal cord; without a microscope, it is tough to remove them. The microscope is allowing neurosurgeons to go through the nose to remove pituitary tumors, which can cause acromegaly (giantism) or Cushing's syndrome, which is rapidly fatal unless treated (SN: 7/30/77, p. 71). Without a microscope, surgeons have to go after a tumor through the top of the head and risk damaging the optic nerve and creating blindness. Microsurgery is helping neurosurgeons perform internal carotid artery bypasses, and, as a Texas study recently showed, the procedure can prevent strokes better than drugs can (SN: 2/3/79, p. 69). Microsurgery is even looking promising in the treatment of spina bifida, which consists of a sac of spinal fluid protruding from the spinal column and causing paralysis below the sac. Here, a microscope allows a surgeon to separate nerves out from a sac before he removes it, thus preserving the nerves — a feat not possible with conventional neurosurgery.

Surgery under the microscope, in fact, has become so popular during the past several years that nearly 100 U.S. surgeons are especially trained in it, and one-third of this country's 2,500 surgeons are now using it for some procedure or another, such as reversal of tubal sterilization; transplanting lower leg bone and blood vessels to an upper thigh that has had a tumor removed; replanting severed fingers, toes, arms and legs; and placing microvascular muscle-skin flaps over large wounds.

Microsurgery should benefit even more areas of surgery in the near future, particularly as operating room microscopes and microsurgical instruments become increasingly sophisticated. For instance, neurosurgeons at Johns Hopkins are working on replacing congenitally damaged nerves in children with good nerves transplanted from other body areas and will be offering, starting in May, one-week courses in microsurgery for physicians from throughout the United States. □