Anesthesia's Second Power:

Probing the Mind

Henry K. Beecher

Dorr Professor of Research in Anesthesia, Harvard University, and *Anesthetist-in-Chief, Massachusetts General Hospital, Boston*

WHEN SIR HUMPHRY DAVY WAS only 20 years old, he made a remarkable study of nitrous oxide. On the basis of his own experiments he not only recommended that nitrous oxide be used for the relief of pain in surgical operations, but he also realized that by breathing this agent it had been possible for him to get at levels of his mind not ordinarily accessible. But let young Davy tell what happened the day after Christmas, in the year 1799.

> I felt a sense of tangible extension highly pleasurable in every limb; my visible impressions were dazzling and apparently magnified. I heard distinctly every sound in the room and was perfectly aware of my situation. I lost all connection with external things; trains of vivid visible images rapidly passed through my mind and even connected with words in such a manner, as to produce perceptions perfectly novel. I existed in a world of newly connected and newly modified ideas. I theorified; I imagined that I made discoveries. When I was awakened from this semidelirious trance by Dr. Kinglake, who took the (gas) bag from my mouth, indignation and pride were the first feelings produced by the sight of the persons about me. My emotions were enthusiastic and sublime; and for a minute I walked about the room perfectly regardless of what was said to me. As I recovered my former state of mind, I felt an inclination to communicate the discoveries I had made during the experiment. I endeavored to recall the ideas, they were feeble and indistinct; one collection of terms, however, presented itself: and with the most intense belief and prophetic manner, I exclaimed to Dr. Kinglake, "Nothing exists but thoughts!—the universe is composed of impressions, ideas, pleasures and pains!"

(Those who are familiar with the history of philosophy will recognize that this is the epitome of that extraordinary school set forth long before this time by Bishop Berkeley.)

I have quoted this experience of the young Davy in some detail, for it appears to be the first recorded example that modern anesthetic agents give possibility of planned access to levels of consciousness not ordinarily attainable, except perhaps in dreams, in trances like those of the poet Tennyson, or not uncommonly in the reveries of true mystics, dealt with in such detail by William James. But dreams, trances, and mystical utterances are subject to the caprice of unknown factors, hardly suitable for methodical investigation. On the other hand, Davy had stumbled upon a quality of anesthetics that holds much of potential value for mankind and has already given a good deal by way of practical result in this field. The potential value, besides the proven worth of anesthetics in dealing with problems of the mind, is great enough to allow speculation.

It was not until 60 years after Davy and 14 years after Morton, in 1860, that another young man, one Benjamin Blood, aged 28, in the unlikely spot of Amsterdam, New York, apparently then without knowledge of Davy, had a like experience on recovering from ether anesthesia. Perhaps because Benjamin Blood was of a more philosophical nature than Davy, or more likely because he did not have so many other things pressing him, he became consumed by curiosity concerning this phenomenon and devoted 14 years to its study before publishing privately his first paper on the subject ("The anaesthetic revelation," 1874).

By "anaesthetic revelation" Blood meant "...a certain survived condition...of an appreciation of the genius of being...(which) cannot be formally remembered" on awakening from anesthesia. Further experimentation convinced him "...that there is an invariable and reliable condition...ensuing about the instant of recall from anaesthetic stupor to sensible observation, or 'coming to', in which the genius of being is revealed but because it cannot be remembered in the normal condition it is lost altogether,...and buried, amid the hum of returning common sense, under that epitaph of all illumination: 'this is a queer world.' " Undiscouraged, Blood probed with anesthetic levers into his subconscious and into that of his friends for 14 years and was the first to attack this problem deliberately with modern anesthetic agents.[1] He struggled to develop anesthetic tools to get at the memories hidden in the subconscious, 70 years before they became effective instruments and 80 years before they were widely employed for narcoanalysis in the recent war.

Based on an address delivered at the celebration of the 100th Anniversary of the First Public Demonstration of Surgical Anesthesia, Massachusetts General Hospital, Boston, October 16, 1946.

[1] Alcohol, opium, hashish, and many other drugs had been known for centuries as effective in releasing certain dreams and phantasies. The use and value of hypnosis in dealing with problems of the mind had been known, also for a long time.

Somehow Blood's work fell into the hands of William James, who, besides his other accomplishments, organized the first psychology laboratory in America in 1875. It would be impertinent of me to appraise the quality of William James. Others better able to do so have said he is one of the two greatest and most original thinkers this country has produced. James's comment on Blood's paper was: ". . . I am conscious of its having been one of the stepping stones of my thinking ever since (reading it)."

Then followed a lively period of human experimentation using the tool of anesthesia to probe the subconscious. (This foreshadowed, of course, one of the important medical applications in World War II.) This work was led by William James in this country and by Sir William Ramsay in England. Primarily, at that time, it was the philosophers rather than the physicians who were interested in this use of anesthetics.

This at times rather tenuous trail from 1799 to the present is marked by what appear to be repeated independent discoveries, an ever-new awareness of still unanswered needs. Whether the next important steps were influenced by Davy or Blood or James is not clear. In any case, they offer an excellent illustration of the sardonic truth that accidental findings oftentimes outreach things sought.

It seems natural in treating excited, hyperactive individuals that sleeping pills and anesthetics would be employed to soothe, even temporarily to put out of action, troublesome persons. Sleep treatment of disturbed individuals was rather widely employed 25 years ago (*3*). In fact, this was so developed that in the early 1920's a good many controversies turned on details of the technic of sleep production.

As experience increased, it became evident that both on induction and on recovery from the deep unconsciousness produced by drugs, deranged patients passed through lucid intervals. Lorenz, in an address given in 1929 (*5*), showed considerable insight in stating his then current view. It can be put as follows (*2*):

An individual develops a psychosis following normal mental life; this psychosis is at a much lower level of mental activity than the normal. If at this point one precipitates unconsciousness by the use of an anesthetic agent, he can pierce through the stupor and reveal the mechanism. It can be observed upon going into this unconsciousness, as well as upon the return journey from it, that the patient's mental condition approaches the normal; but after his normal mental life has been attained, the various factors responsible for his original psychosis weigh on him, and after a period of some hours he retires to the more primitive level; apparently this seems to him a desirable refuge from normal consciousness.

Much of the work of this period was based upon the assumption that full anesthetization was the important thing. Lindemann (*4*) questioned this, and his points were good. He carried out experiments guided by the assumption that the impressive effects of anesthesia (barbiturate) cannot be sufficiently explained by the unconsciousness produced. He found that small doses of sodium amytal, the agent then in use, even without the production of unconsciousness, produced the same striking changes in the patients as the anesthetic doses. He tried the agent in normal individuals and here, too, found that small doses produced "a feeling of security and well-being, a desire to communicate and to speak about problems of personal matters usually not spoken of to strangers. There was also the feeling of being unable to guard against saying things which one does not want to and an inability to refuse to answer questions even if they refer to very intimate matters. There was a feeling of increased physical and mental abilities . . . ." (This is more than reminiscent of Davy's and Blood's "anaesthetic revelation.") Patients who had been mute for months spoke. Depressed patients gave subjective reasons for their feelings of guilt. "Anxiety and apprehension gave place to mild indifference and a tendency to joke." It is not surprising that the newspapers at once called this agent "truth serum." As the years have passed the important fact has become clear that the patient's inability to hold back extends also to unpleasant emotions. He gives vent to these with relief.

With such chemical tools the analyst was helped to get at this material and to identify himself with the newly revealed past of the patient. The technic was then on the basis where it could be so effectively employed by Grinker and others in the war just ended.

During the war there were now and again startling examples of the use of its powerful machinery to accomplish some trivial thing or to perform some individual cruelty. This curious tale has to do with such a situation and a soldier named Wyatt, who had the misfortune to be caught in an open field by an enemy tank. Through some perverse whim of the tank crew he was not shot, as he easily could have been. Wyatt saw the tank turn and start toward him. As quickly as he could, he threw himself into the nearest slit trench. The tank passed over without harm. His relief was short lived, for it was evident that he was not to escape so easily. The tank reversed and passed again over the trench. Then the horrible truth was clear: he was going to be ground under the tank treads. Each time the tank charged over his narrow refuge its whirling cleats came nearer. He lost consciousness or, more likely, became amnesic. Either the tank crew thought the man adequately disposed of and left or was driven off by a better adversary; Wyatt never knew. At any rate, he survived.

When he was brought into a hospital the whole episode was hidden below the conscious level. He remembered nothing of it and remained a shattered man, driven by

nightmares, unfit for combat or for life outside a hospital. Nothing helped him until he was put half under anesthesia and this blank period probed by a psychiatrist. Finally, he remembered and could talk about it. Without entering the controversy as to the durability of such improvements, it must be agreed that the immediate insight and information obtained and the immediate therapeutic effects are spectacular.

The next example illustrates the use of these agents in a mentally sound but distressed individual.

In most of us is firmly grounded the common belief that wounds are inevitably associated with pain and that the more extensive the wound, the worse the pain. Observation of freshly wounded men in the combat zone (*1*) showed this generalization to be misleading. Even when no morphine had been given for many hours, only one-quarter of the severely wounded men (not in shock) said on direct questioning that they were having enough pain to want anything done about it. Even so, there was a considerable group that came into the forward hospitals writhing and crying out with pain. This is not intended to minimize the fact that wound pain may be agonizing, as it unquestionably was in some cases, but to point out that drugs with anesthetic power—barbiturates in this case—in doses too small to be effective in relieving true pain, serve another and equally dramatic effect. This use of these agents can be illustrated.

It was just after dark on the beachhead, and a heavy rain was sluicing over the wet canvas of the hospital's admitting tent. The wet tent flaps had been yanked back with vigor, and several men tried to enter at once. In addition to the wounded man and the two Italian litter bearers, three others were with difficulty holding the wounded man down. He was a husky fellow of 19. "You fools, let me up. Can't you see I'm lying on my rifle? Get me out of here and off this thing."

The man complained bitterly of the pain in his back. There appeared to be plenty of reason for this: Eight ribs were cut in two and his collapsed lung exposed. Later we found that a sharp rib end had punctured his diaphragm and a kidney. He was so active that no one could examine him adequately, he was blue from inadequate ventilation of the collapsed lung, and he was manic from "pain."

Study of the problems of newly wounded men gave reason to believe that such a man needed something in addition to, or in place of, the usual morphine. Although morphine relieves pain, even in a dangerously large dose it often failed to solve similar problems. Perhaps a barbiturate would relieve this distress.

This soldier had been wounded by a mortar shell five hours before hospital entry and had had no morphine for at least four hours. He was given a small dose of a sedative intravenously, but no morphine. He immediately quieted down and was soon exhaustedly sleeping. He was by no means anesthetized; it was easy to arouse him. He slept, and for the first time it was possible to examine him well. A small dose of a barbiturate had eased the mental distress with the result that his physical agitation let up. It was possible in an hour to get the man into good enough condition to withstand a trying operation, and he got along well.

This case was the forerunner of others in which the great value of small doses of sedatives in relieving the distress of the wounded was established. In some men sedation alone was needed, while in others it was found that one could accomplish with small doses of both a sedative of the barbiturate type and a narcotic (morphine) things that could not be achieved by large doses of either agent alone. Perhaps the wounded soldiers who get "pain" relief from small doses of barbiturates are in the three-quarters of the severely wounded who do not have severe pain, and the hyperactivity, restlessness, and writhing, usually attributed to pain, merely the manifestations of an acute anxiety state, improved by the barbiturates.

Agents that fall into the group of the anesthetics thus have power in addition to their anodyne effects—a power to reveal, to control, and to relieve problems of the mind.

The pain-relieving power of anesthetics was recognized before the emphasis on the laboratory existed in medicine; psychiatry has become aware of the mental effects of these agents only in recent years.

Experimental reproducibility of clinical states is a first requisite in the study of many problems of medicine. With anesthetic agents we seem to have a tool for producing and holding at will, and at little risk, different levels of consciousness—a tool that promises to be of great help in studies of mental phenomena. Thus, anesthesia, in presenting a reversible depression, enables the study of the life process itself. The potentialities for future discoveries in this field seem scarcely to have been tapped.

In the biological laboratory, the first-rank problems of anesthesia are as fundamental and as difficult as any in medicine. The anesthetic process is bound up with irritability, one of the fundamental characteristics of living tissue. As Lillie pointed out years ago, the problem of the general nature of anesthesia is inseparable from the wider problem of the nature and conditions of irritability in general. Such truths are as cold and remote as the laboratory from human suffering, but as truths they must be broadly applied to these problems if such agents are not only to have power to relieve pain of body but effective power to resolve distress of the mind.

References

1. Beecher, H. K. *Ann. Surg.*, 1946, **123**, 96.
2. Bleckwenn, W. J. *Proc. Ass. Res. nerv. ment. Dis.*, 1931, **10**, 224.
3. Hinsie, L. E. *Psychiat. Quart.*, 1929, **3**, 5.
4. Lindemann, E. *Proc. Soc. exp. Biol. Med.*, 1931, **28**, 864-866.
5. Lorenz, W. F. *Psychiat. Quart.*, 1930, **4**, 95-102.