

SOME NEWER METHODS OF REDUCING THE  
MORTALITY OF OPERATIONS ON  
THE PELVIC ORGANS

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Since the inauguration of the aseptic era the mortality-rate in abdominal operations has been falling steadily and to-day there are practically no deaths from simple abdominal operations for conditions unaccompanied by organic disease or infections.

This reduced mortality-rate is due in part to an improvement in technic, but very largely to the exercise of an increasingly critical judgment on the part of the surgeon in his selection of cases.

The technic has become standardized for such routine operations as the removal of benign tumors of the pelvic organs and for operations for chronic pyosalpinx, procidentia, prolapsus uteri, etc. The rare fatalities which occur in these apparently favorable cases result from some unforeseen and as yet uncontrollable factors such as embolism.

The results secured by the individual surgeon have come therefore to depend on two factors: his mastery of general operative technic and his policy in the selection of cases for operation.

The reclamation of the handicapped patient, however, has been and is one of the most cogent surgical problems. Mortality-rates would indeed be high were they based only on operations on patients with hypertension or hypotension, the result of infections or organic diseases; but I believe that even in these cases patients may be operated on successfully, not only without fatal end-

results, but without the familiar train of disastrous sequelae, so disheartening to patient and surgeon alike.

If operations on handicapped patients can be postponed safely, the underlying causes of the hypertension or hypotension may often be combated successfully. Physiologic rest, diet and special therapeutic measures may avail to bring the patient to a condition in which operation may be safely attempted. The handicapped patient has been searchingly studied by the able chairman of this section, Dr. Simpson.

Our problem is (1) to discover what may be the special risks when operation cannot be postponed; and (2) to evolve means by which those risks may be obviated or minimized.

The natural sequelae in hypertension cases are embolism, thrombosis, renal insufficiency, angina, pneumonia and cardiac failure. The same train of disastrous results may be seen in persons with hypertension who have been injured in accidents, and also in physically uninjured persons who have undergone some severe psychic shock. Since both psychic and physical strains produce identical results in patients with hypertension, it would seem that the seat of danger must be found at the final point of meeting of both psychic and physical impressions—that is, in the brain tissue.

A long series of laboratory experiments on animals subjected, some to emotional excitation, and others to physical trauma under anesthesia, showed that identical brain-cell changes were caused in each case. That is, both physical and psychic stimulation exhaust the physical substance of the brain cells. Emotional stimulation not only causes brain-cell deterioration, but produces also an increase of the internal activating secretions—epinephrin, thyroid secretion, glycogen—a vital point in cases of hypertension.

A logical conclusion from these experiments was that if an operation could be so performed that no traumatic impulse could reach the brain, and if in addition all

emotional stimuli connected with the operation could be removed or reduced to a minimum, then the dangers of operation would be those only which would result from the local injury inflicted. Brain-cell exhaustion would be prevented, as would the disastrous effect of the presence in the body of increased amounts of the energizing products of internal secretions.

#### TECHNIC

From these premises I have evolved an operative method which I have named anoci-association because by its use all nocuous, or noci-associations are cut off from the brain. The complete operative procedure under this principle includes a lessening of the pre-operative psychic strain by the administration of solacing drugs; the administration of a general inhalation anesthetic to obliterate harmful impressions in the course of the operation; the progressive use of a local anesthetic to prevent the passage to the brain of traumatic stimuli from the field of the operation, and finally the use of a local anesthetic of lasting effect that the tissues may be kept relaxed and that painful after-effects may be eliminated or minimized.

In such an operation the brain cells have been subjected to no exhausting strain from painful impulses received through contact ceptors; and since the special senses have been closed to all impressions no psychic stimuli have reached the brain, so that the energizing organs in turn have not been pushed to increased activity.

From an operation conducted after this technic the patient with hypertension will emerge not only no worse for the experience, but it may be in actually better condition, because the body and brain have been so completely at rest.

The same technic avails also for the patient with hypotension whose brain cells are already weakened and exhausted by the anemic condition. In hypotension we have a definite and efficient remedy, for the condition is logically to be met by direct transfusion of blood; as

occasion demands, this may be done several days before, just before, during the operation, or immediately thereafter. In these cases of hypotension, however, the margin of safety is much reduced, for some brain cells may have deteriorated from exhaustion beyond the power of resuscitation by rest or transfusion, so that it is of vital importance so to perform the operation that the already diminished resisting powers of the patient may not be further depleted.

In addition to the psychic and traumatic dangers in operations on handicapped patients, one other operative factor—the anesthetic—should receive most careful consideration.

Ether anesthesia has certain advantages. It is relatively safe in inexperienced hands; its bulk is small; it is inexpensive; it requires the simplest apparatus for administration. Against ether, however, stand certain ill effects, objectionable always, but of peculiar danger to patients with hypertension. However skilfully it may be administered it always induces a period of psychic stress in the earlier stages of its administration; the strain of ether nausea and vomiting is especially dangerous in these critical cases which we are considering; the dose of ether required to dissolve the lipoid in the brain sufficiently to cause anesthesia dissolves also the lipoids in the liver, the kidneys, the red blood-corpuscles and other important structures. Ether also chemically hinders or prohibits phagocytosis; hence it may produce nephritis and pneumonia, and, of vital importance in hypotension cases, anemia. Ether immediately impairs the immunity of the patient so that infections find a ready recipient.

I have therefore made nitrous oxid the anesthetic of choice, because it is devoid of harmful after-results, and serves as a measurable protection against shock, since by its hindrance to oxidation it diminishes brain-cell changes—a fact which I have established experimentally. It is an expensive anesthetic and should be given only by a specially trained and skilful anesthetist, objections which

can have no weight as compared with the resultant advantages to the patient derived from its use.

The complete technic in abdominal operations is as follows: When the preoperative strain is great, an hour or so before the operation the patient is given a hypodermic injection of 1/6 grain of morphin and 1/150 grain of scopolamin, that he may receive the solace and quiet which come from the use of these drugs. In exceptional cases the inhalation anesthetic may be administered in the patient's room; or else, in the apathetic state produced by the morphin and scopolamin, the patient is conveyed gently to the operating-room, where a specially trained anesthetist administers nitrous oxid. When the patient is anesthetized the division of tissue is preceded by nerve blocking by means of the local administration of 1:400 solution of novocain. Each division of tissue in the course of the operation is preceded by the infiltration of this local anesthetic, the block being made so complete that no nerve is left free to carry a single activating impulse to the brain. First the skin, therefore, then the subcutaneous tissue, then the fascia, and finally the remaining muscle or posterior sheath and the peritoneum are in turn novocainized, subjected to momentary pressure to spread the anesthetic, and then divided within the blocked zone. If the blocking has been complete, then on opening the abdomen there will be found no increased intra-abdominal pressure, no tendency to expulsion of the intestines, and no muscular rigidity.

The peritoneum is next everted and a 0.5 per cent. solution of quinin and urea hydrochlorid is infiltrated about the line of proposed sutures, and, as before, the parts are then subjected to momentary pressure. This infiltration serves as a block, and as its effects last for several days it should prevent or at least minimize the postoperative wound pain and the postoperative gas pain, and by so much minimize postoperative shock. The quinin and urea salt causes a certain amount of edema of tissue, which lasts for some time after the wound is

healed. The relaxed abdominal wall will permit exploration of the entire abdominal cavity with ease. If there is no cancer or acute infection in the field of operation, then the following regions may be blocked as completely as, and in the same manner as, the abdominal wall, namely, the meso-appendix, the base of the gall-bladder, the uterus, the mesentery and any portion of the peritoneum. In performing a hysterectomy the broad and round ligaments are thoroughly infiltrated with novocain before they are severed, and again before the wound is closed the stumps may be completely infiltrated with quinin and urea hydrochlorid, thus giving a degree of anesthesia for at least two days. On account of the absence of nociceptors, operations on the stomach and intestines made without pulling on their attachment cause no pain, and hence the novocain infiltration of these viscera is not required. If the brain has received no stimuli during the operation, then the closure of the upper abdomen is as easy as the closure of the lower; all is done with the ease of relaxation.

What is the result? No matter how extensive the operation, no matter how weak the patient, no matter what part is involved, if *anoci* technic is perfectly carried out the pulse-rate at the end of the operation is the same as at the beginning. The postoperative rise of temperature, the acceleration of the pulse, the pain, the nausea and the distention are minimized or wholly prevented.

#### RESULTS

I have described the complete *anoci* operation. What is its effect on the postoperative conditions—the morbidity and the mortality? Let us take each morbid manifestation in turn.

1. *Postoperative Pain*.—Quinin and urea hydrochlorid wholly prevents pain if it is injected into the entire wound. But quinin and urea cause some edema of the wound; hence one should limit the wound infiltration to cases needing it, that is, bad risks generally.

2. *Postoperative Gas Pain*.—This baffling phenomenon may be largely or wholly prevented by the technic described, that is, by the hypodermic infiltration with quinin and urea hydrochlorid of a wide margin of tissue, including every part of the divided peritoneum. The stitches must be inserted within the blocked zone. Postoperative gas pain can be explained as a biologic adaptation to overcome infection. In the course of evolution all abdominal penetrations are infected, but the peritoneum is able to overcome most infections if they can be localized. To localize an infection the intestine and the abdominal wall must be kept fixed against each other; that they may do so each must be inhibited; the intestine must be distended with gas, the abdominal wall must be rigid. If the intestine be distended with gas and fixed, then digestion must cease. If digestion be arrested then there is anorexia, or even vomiting to expel food from the stomach. This shows us how postoperative gas pain is due to a biologic adaptation to overcome infection, and explains its resemblance to incipient peritonitis. Nature does not depend on the surgeon or perhaps she knows the surgeon too well. The test of this hypothesis is easily made. If the brain, through which this adaptive response is made, is kept in ignorance of the incision into the peritoneum (*a*) by progressive novocain blocking throughout the operation and (*b*) by postoperative quinin and urea blocking to prevent later communication with the brain through stitch tension, then there should be no gas pain. Clinical experience has abundantly confirmed this hypothesis. It must be remembered that if a single nerve filament escapes the block there will be gas pain.

3. *Painful Scar*.—I postulate that the lesion of a painful scar is in the brain, not in the scar; that it is due to the low threshold produced by injury, and is intimately connected with a fundamental principle of nerve conduction. This fundamental principle relates to the fact that a strong traumatic or psychic stimulus produces some change in the conductivity along its cerebral arc, the

effect of which is that of lowering the threshold of that arc. This might be illustrated by the phenomena following a hold-up at the point of pistol at a street corner. For a long time after such a psychic stress any association with that particular corner would recapitulate the experience. In this manner throughout life the various experiences may lower the threshold in innumerable ways. I assume that there is a similar result after a traumatic stimulus. The arc receiving the stimulus suffers a lowered threshold and hence from that time on mere trifles become adequate stimuli. Such a result is seen in the sensitiveness after fractures and in the painful stumps of crushed limbs. Now, if an operation is so performed that no strong stimulus reaches the brain either during or after the operation, then the thresholds of the cerebral arc from the wound will not be lowered. Since the threshold is not lowered, contact with the scar or any injury to that part will have no more effect than will contact with any other part of the body. In other words, the scar will be no more sensitive than is the skin elsewhere. Hence we see how painful scar may be prevented by complete anoci. Clinical data seem to support this hypothesis, although it has not as yet been fully worked out.

4. *Nervousness.*—When in the night one is threatened with an unknown danger, the brain threshold is always lowered, apparently as an adaptation to the more swift and accurate detection of the danger. Likewise, when one has received a crushing physical injury there is a universal lowering of the threshold. During these states of tenseness minor stimuli have major effects, or, in other words, one is “nervous.”

Now, as we have seen, the subconscious brain is tortured directly during unblocked operations under inhalation anesthesia. The resultant general effect on the brain thresholds is demonstrably the same as if the injury had been inflicted without anesthesia, that is, after the punishment of the subconscious mind during an operation the patient emerges “nervous” and “exhausted”;



and since a low threshold is lavish in its waste of nervous energy, recuperation is slow. Hence there results a period of postoperative nervousness, of postoperative loss of efficiency. It is obvious, and clinical experience abundantly proves this, that the threshold is preserved by complete anoci; hence the unpleasant, damaging postoperative phenomena are avoided.

5. *Aseptic Wound Fever*.—Since it is a physical law that any form of force may be converted into heat, and that heat thus produced, if not at once transformed into motion, must increase the temperature of the body affected, we see readily why any stimulus, mechanical or physical, which normally would increase motor activity, must cause a rise in temperature if complete motor expression is impossible. Anything, therefore, that drives the motor mechanism of the body beyond the point of normal expression will cause fever. Anger, athletic contests, fear, physical injuries, all produce a rapid oxidation of certain body compounds too great for complete translation into motion.

In operations under general anesthesia only, we expected routinely to see some postoperative rise of temperature as a result of the suppressed power of motor response to the physical and psychic injury; but by the use of anoci-association, both during and after the operation, I discovered no change in the postoperative temperature and pulse-rate. I therefore was forced to the conclusion that, barring infection and the absorption of hemoglobin, postoperative fever is the result of increased oxidation, this being in turn the result of the psychic and traumatic stimuli of the operation to which the natural response had been denied.

So much for the postoperative morbidity. Not only does the surgeon, but also the patient, the intern and the nurse corroborate the story.

As for the mortality-rate, hospital statistics abundantly verify our conclusion. At the Lakeside Hospital since the introduction of this method, my associate, Dr. W.

E. Lower, and myself have performed 250 pelvic operations, with but two deaths, a mortality-rate of 0.8 per cent.

Although my purpose in this paper is to deal only with pelvic operations, a word may be added regarding the application of this principle in a general surgical practice. Last year Dr. Lower and I performed 729 abdominal sections of every grade with a mortality-rate of 1.7 per cent., and in the Lakeside Hospital service, where all kinds of acute emergencies are met, and where most of my own private work is done, there were performed by my associates and me in the past year operations on 2,672 patients with a mortality-rate of 1.9 per

Death rate % per 1,000	1	2	3	4	5	6	7
1898	[Bar extending to column 6]						
1908	[Bar extending to column 4]						
Last 1,000 cases	[Bar extending to column 1]						

Comparative mortality rate of the Lakeside Hospital Service. The first line shows the mortality rate when the hospital was first opened in 1898. The second line shows the mortality rate for the year before the anoci technic was introduced. The last line shows the mortality of the last 1,000 patients operated on at the Lakeside Hospital by the resident staff, Dr. Lower and myself.

cent.—a result never before approached in that hospital. In the last thousand operations performed by Dr. Lower and myself, these operations including every risk in a general surgical practice, the mortality-rate has been 0.8 per cent.

Osborn Building.

#### ABSTRACT OF DISCUSSION

DR. HENRY O. MARCY, Boston: The matter presented shows clearly that the dynamic energy of the individual is the thing to be preserved. While a student in London, in 1870, Sir James Paget said to me, "Dr. Marcy, do you know how to give ether?" They had had twelve deaths in the city from chloroform in the previous six weeks, and I had the opportunity of administering ether, the first time, he said, that it was ever given in London. I gave it after the old-fashioned method which we were taught in the Massachusetts General Hospital and submerged my patient, but, fortunately, not to her death. Fifty years ago we gave chloroform in the U. S. Army, but it was given carefully and there were comparatively

few accidents. When we give alcohol—and ever remember that ether is an acute alcoholic poison—we must know that we are lessening the dynamic energy of life, that we are lessening the circulatory power, and, consequently, lowering the resistance of the patient. Thus, it behooves us, in whatsoever way we give an anesthetic, to remember, first, the emotional conditions of the patient himself, and then study carefully the conditions before we operate as well as during the operation.

DR. C. O. THIENHAUS, Milwaukee, Wis.: I should like to ask Dr. Crile whether or not he would think it advisable to use the injections for the purpose of producing local anesthesia in cases of extra-uterine pregnancy with acute hemorrhage? I believe that for such cases the operation in the so-called "exciting stage of ether anesthesia" is the best method because it saves time. I feel furthermore that the fact is much overlooked that it is entirely wrong to transport these patients to a hospital. They must be operated on at home as rapidly as possible. Some of these patients who are almost pulseless hardly need any anesthetic at all and still, by prompt interference, quite a few of them have been saved, as can be shown by statistics.

Another fact ought not to be forgotten, and that is that the severest cases of general peritonitis following perforations, as well as the severest cases of internal hemorrhage never reach a hospital and, therefore, are not included in the statistics of hospital surgeons.

DR. ARTHUR E. HERTZLER, Kansas City, Mo.: There are two points which I should like to bring out: (1) the short duration of novocain anesthesia—not over fifteen minutes, too short to be of much use as a block; (2) the question of hyperesthesia in the regions anesthetized. In the use of a local anesthetic we obtain an exquisite hyperesthesia which may last for days. If this region is made the object of any irritation by suture or otherwise, it is a constant source of irritation and defeats the purpose. I have been working on this problem ever since my assistant called attention to the value of local anesthesia for the lessening of the pain, and we still have little to offer. In the transversalis and the parietal peritoneum, in which the chief difficulty lies, the nerve-supply is exceedingly complex. The nerves come in external to the fascia of the transversalis and ramify external to the parietal peritoneum. How any one is going to block any particular area and keep from striking a set of nerves around the hyperesthetic area we have been unable to determine. What we have demonstrated is that much can be gained by avoiding the nerve areas in all kinds of traumatism, whether it be by suture, forceps or some other means. It is useless to infiltrate tissues that contain no nerves. I should also like to make a point, particularly for personal information, regarding Dr. Crile's statement that

quinin produces edema. We have made a careful histochemical study of the effects of quinin on the tissues, and we have not observed that there is any edema produced. We do get an exudate of a granular fibrin in many instances, particularly if the use is excessive, but have never observed that either cellular or edematous infiltration takes place.

DR. GEORGE GELLHORN, St. Louis: It seems to me timely to point out that spinal anesthesia preeminently belongs among the newer methods of reducing the mortality of pelvic operations. It is this method above all others that fulfils all the postulates of anoci-association. The brain of the patient does not know anything of the operation and consequently there is no shock. I can also confirm Dr. Crile's statement, that, because of the blocking of nerve impulses, gas pain is considerably less after spinal than after ether narcosis. It is not altogether absent, but reduced to a marked extent. I hope that Dr. Crile will define his views on spinal anesthesia in his closing remarks.

DR. GEORGE W. CRILE, Cleveland: Replying to Dr. Thienhaus' question: Of course, if one encounters an emergency of any kind, the method is not satisfactory outside of the hospital. That question must be settled on its own merits. One would not feel like abandoning a great surgical principle simply because it could not be applied to patients outside the hospital. I am speaking of patients on which this technic can be carried out. Of course, it is quite important to arrest the hemorrhage early. I am sure we all agree to the remark Dr. Thienhaus made.

All that I can say with regard to Dr. Hertzler's points is that it is a clinical fact that by local infiltration one can anesthetize the abdominal wall or any other tissue, if the work is done carefully and well. If one makes a complete infiltration and applies local pressure immediately, a local anesthesia can always be secured. I do not mind particularly what the ultimate facts are regarding the tissues so long as the end is accomplished. I am glad to have Dr. Hertzler assure us that there is no edema; but, I notice this: Quinin and urea hydrochlorid do produce a certain amount of swelling in the wound afterward, more than any other agent I know of. Novocain does not produce any swelling at all. I wish Dr. Hertzler would tell us how we can avoid the swelling which follows the injections, because these injections give something to our operations which we have never before secured. I am ready to be convinced that spinal anesthesia is a safer form of anesthesia than can be secured by our methods. It is because I have not been sure that spinal anesthesia is the safest that I have gone to the trouble of working out the nerve-blocking system. Considering our remarkably low mortality-rate and our marked control over our patients, I should not be willing to give up this method until I was sure that the substitute would be quite as safe.