

## LOCAL AND REGIONAL ANESTHESIA \*

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THE two types of anesthesia to be described herein can be defined as follows: Infiltration anesthesia, is *local infiltration* of an anesthetic agent, is carried out by either a surgeon or an anesthetist, and is a relatively simple and useful procedure: the agent used is injected directly into the tissues at the site of the incision.

Regional anesthesia, on the other hand, is the deposition of an anesthetic agent near particular nerves, either close to or at some little distance from the operative site. Motor function may or may not be interfered with. Such procedures as paravertebral nerve block, transsacral block and subarachnoid block are examples of regional anesthesia.

## REQUISITES TO A SUCCESSFUL ANESTHETIC RESULT

*Anatomic Knowledge.*—Any physician or anesthetist desirous of using either of these procedures should have a working knowledge of descriptive and topographic anatomy, especially that aspect of it which deals with the distribution of the nerves. When the anesthetic agent is injected into the vicinity of, or in direct contact with, the nerve tissue, a physiochemic combination occurs, resulting in modification of the normal function of the nerve so affected. Impulses, originating at the periphery, either are not transmitted at all or are appreciably slowed and weakened on their way to the central nervous system. The transmission of impulses originating in the cerebrospinal centers also is interfered with, but all impulses are not necessarily cut as a result of this physiochemic reaction of anesthetic agent and nerve tissue. Rather, some are modified; for instance, painful stimuli are not felt by the patient, or they may be interpreted as touch, pressure or contact. The pain which ordinarily would follow incision into muscle substance is not interpreted as pain, but rather as a reflex reaction which occurs and is manifested as true muscular twitching.

*Selection of the Particular Anesthetic Procedure.*—At the time of the surgical consultation and when the question of anesthesia is discussed, certain salient points must be considered when a local or regional anesthetic procedure is contemplated. First of all, the mental attitude of the patient toward the form of anesthesia to be used must be deter-

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mined. If the patient is nervous or hysterical, some other form of anesthesia probably would be preferable, provided there is no special reason for the use of local or regional anesthesia. Many patients are afraid to be awake during operations and in kindness to them this point must be remembered. It may suffice, however, if these patients are sufficiently medicated before the operation. As a rule local or regional anesthesia is not well suited to younger children, although when either form is combined with the use of a gaseous anesthetic agent, it frequently is very useful.

Second, the region of the body to be operated upon must be considered. The value of regional or local anesthesia is not the same for all parts of the body; there are also indications for other forms of anesthesia than the regional or local type. Operations on the legs, for instance, usually can be done very successfully with the patient under the influence of spinal anesthesia, whereas an operation for removal of a lung preferably would be carried out with the patient under the influence of some form of general inhalation anesthesia.

Moreover, the type of operation to be employed also plays an important part in the decision for or against regional or local anesthesia. Many operations are performed in the physician's office, and in such cases local or regional anesthesia does not prolong unduly the patient's stay in the physician's office. It often happens that an experienced anesthesiologist is not available, and the surgeon must carry out anesthetic procedures himself. In such a circumstance local or regional anesthesia is very valuable. It has been the experience at the Mayo Clinic that certain operations are particularly well suited to regional anesthesia; for instance, operations on the kidneys, ureters, for repair of inguinal hernia, and others can be carried out with the patient under the influence of subarachnoid block anesthesia. The lower part of the rectum can be operated on and hemorrhoids can be removed with the patient under the influence of transsacral anesthesia. Regional and/or local anesthesia is well adapted to operations for unroofing of empyematous cavities, excision of lymph nodes for biopsy, and the like. The extremities can be operated upon to advantage by these methods. It may be that surgical operations in the upper part of the abdomen are carried out best with the patient under the influence of general anesthesia; however, many surgeons prefer to operate in this region with the patient under the influence of spinal anesthesia because of the excellent muscular relaxation thereby obtained. Field block of the abdominal wall and one of the general types of inhalation anesthesia constitute a good combination.

*Cooperation of All Concerned.*—Irrespective of how well a particular local or regional anesthetic procedure is performed, perfect anesthesia does not necessarily follow.

To obtain the best results from either of these two forms of anesthesia, the cooperation of the hospital personnel, the patient himself,

the surgeon and his assistants and the anesthetist is essential. Any one of these component parts can and sometimes does detract from what otherwise would have been a good anesthetic result.

The hospital personnel should be so aware of the value of these forms of anesthesia that such expressions as "I would not take a spinal" or "nobody would do an abdominal block on me," are never heard. Instead, encouragement on the part of the attending nurse or an expression of satisfaction to the patient often contributes much toward establishing the confidence of many patients in these procedures.

If the patient is skeptical or fears those procedures, it is sometimes wise not to encourage him unduly. But, even in these cases, if general inhalation anesthesia is contraindicated, acceptance of local or regional anesthesia should be encouraged.

When the value and advantage of these procedures are explained to patients, many will acquiesce in the choice. If the patients are assured that they may experience a sense of pressure but not pain, or that, if they become unduly tired, restless or nervous, they may receive some medicament to relieve them, many will leave their anesthetic problems with those better qualified to judge as to the best form of treatment to be used. Above all, the patient should understand that his complete cooperation is absolutely essential to a satisfactory result.

The surgeon and his assistants have an important part to play in the success of these procedures. Before the incision is made the question so frequently is asked, "Is this sharp or dull?" or "Do you feel that?" A conscious patient almost invariably will say in self-protection, "Yes," because he is afraid the next move will hurt, or he will interpret a sensation of pressure as pain, and so on. Such leading questions should be omitted from the conversation between patient and surgeon. Instead, the surgeon can palpate the area, judge the tenseness of muscles and interpret the presence or absence of pain by the patient's own verbal or facial expressions. To say, "I am starting the operation now," will implant a mental hazard in anyone's mind. If the surgeon will remember that gentleness in the handling of tissues contributes much to the comfort of patients when the two types of anesthesia under consideration are being used, all concerned with the operation will do better.

As for the anesthetist, his role does not end when the injection has been completed. Not only must the patient's blood pressure, pulse and respirations be watched carefully, but the whole physical and mental comfort of the patient must be guarded and insured. To see that the patient is comfortably placed on the operating room table, to guard arms and wrists from undue pressure and fatigue, to keep the patient's lips moist, and to carry on a pleasant conversation with the patient (if this last action does not disturb the surgeon) all constitute the duty of the anesthetist. If supportive treatment, such as commencement of the intravenous administration of fluids, and so forth, is necessary,

the anesthetist may do this as part of his treatment. When and if the patient becomes unduly disturbed, tired or restless, the anesthetist should be ready with combinations of agents and various maneuvers which will serve to soothe him. The simple moving of supporting pillows, the intravenous administration of morphine sulfate, the use of pentothal sodium or one of the gaseous agents combined with local or regional anesthesia, assist to make a satisfactory anesthetic procedure out of what might be termed only "fair" results. When any of these procedures are decided upon, no delay should be allowed in the execution of them. Above all, the patient's mental and physical welfare must be guarded at all times, and this can and should be done by the anesthetist.

#### QUESTION OF SURGICAL RISK

It is admitted rather generally that local or regional anesthesia is particularly advantageous for many patients who are "poor surgical risks." Local or regional anesthesia is not a panacea for the difficulties of all "poor risk" patients, but for many of them it is advantageous. Because of the low physical resistance of these "poor risk" patients, that anesthetic procedure which is most easily and safely tolerated by the body in general and any diseased tissue in particular is the procedure of choice. A patient who has active pulmonary tuberculosis should receive some form of anesthesia as previously described; a patient who has severe cardiovascular involvement frequently is maintained better by, for instance, spinal anesthesia and the continuous administration of oxygen than he would be by spinal anesthesia and the administration of a general inhalation anesthetic agent.

It has been said that a person who has diabetes which is controlled can tolerate almost any form of anesthesia if his preoperative and postoperative diabetic treatment is carefully watched (1). By and large, it can be said that local or regional anesthesia is of distinct value for the "poor risk" patient.

#### ADVANTAGES OF LOCAL OR REGIONAL ANESTHESIA

Local or regional anesthesia has certain definite advantages over general inhalation anesthesia. Local or regional anesthesia is not necessarily dangerous to life. In the hands of the average experienced anesthetist subarachnoid block anesthesia gives complete muscular relaxation, which so many surgeons require because it allows them the greatest freedom in operating within the patient's abdomen. When this type of anesthesia is employed, the central nervous system is left intact to carry on its vital functions. The general condition of the patient usually is not affected by procedures such as subarachnoid block.

Regional anesthesia does not, it is true, prevent pulmonary embolism, but because regional anesthesia does not involve the respiratory

system, the patient who receives it in many instances may not tend toward pulmonary complications so readily as would the patient anesthetized by other methods. Frequently, when regional anesthesia is employed, the immediate postoperative convalescent period is so much more free from nausea and vomiting, intestinal distention and the like than it would be otherwise that the method represents a distinct advantage to the patient's comfort. Ingestion of a normal diet can be resumed relatively early, in many cases.

#### INDICATIONS

When some type of anesthesia must be carried out and a trained anesthetist is not available, regional anesthesia should be used as often as possible. In most cases, minor surgical procedures can and should be performed by this method. If the general condition of the patient is such that use of a general anesthetic agent is contraindicated, this form of anesthesia should be employed without hesitation, and this is particularly so in the presence of chronic conditions of the kidneys, lungs, heart and vascular system. Certain operations around the neck, such as tracheotomy and laryngectomy, are best carried out with the patient under the influence of this form of anesthesia. Operations on the genito-urinary tract, perineum, anus and rectum and the upper and lower extremities lend themselves particularly well to special forms of local or regional anesthesia. Labat (2) has written: "Subarachnoid block is indicated in all operations below the diaphragm, when the other procedures of regional anesthesia cannot be induced successfully or are likely to fail. It is thus the procedure of choice in fat patients." Labat's statement in our experience applies to patients who are moderately obese, but when patients are excessively heavy (300 to 400 pounds [135 to 180 Kg.] or more), spinal anesthesia may be accompanied by sudden, severe decrease in blood pressure.

#### CONTRAINDICATIONS

As a rule a nervous or hysterical patient is a poor subject for this form of anesthesia. Unless it is specifically contraindicated, some type of a general anesthetic procedure should be carried out for such patients. Young children are not "good" patients (in the special sense of this context) unless extensive premedication has been done before regional anesthesia is produced. Injection should not be done into tissues edematous, swollen, inflamed, and/or infected. Patients who have severe backache frequently are not well suited to spinal anesthesia; often they will complain of aggravation of the backache post-operatively. There are certain definite contraindications to the production of spinal anesthesia, alone or in combination with other agents, such as, for instance, tuberculosis of the spinal column or pathologic fracture or metastatic lesions of the spinal column. These usually

preclude the use of this form of anesthesia. Moreover, there are certain conditions of the spinal column, such as scoliosis, hypertrophic arthritis and others that frequently make lumbar puncture exceedingly difficult; in fact, if it were attempted in the presence of one of these conditions it might cause a considerable amount of local trauma to the tissues and periosteum, aggravating backache already present or producing definitely new backache. A patient suffering from marked debility, with a value for hemoglobin of less than about 7.5 Gm. per 100 cc. or with a systolic blood pressure of less than 100 mm. of mercury, should not undergo spinal anesthesia. Known malingerers or persons known to have a definite phobia in respect to the possible dangers which might accompany or follow spinal anesthesia or anyone who has headache of long duration or a history of headache which followed some previous procedure such as spinal tap, probably would do much better under the influence of some form of anesthesia other than regional anesthesia. A patient in a state of severe shock, or one who has suffered hemorrhage in a previous operation or might suffer severe hemorrhage during the contemplated operation, or one in whom there are very definite electrocardiographic changes which indicate serious disturbance of the heart, usually must not receive this form of anesthesia except in those cases in which a very small dose might be administered safely low in the lumbar region for operations on or about the perineum.

#### CONCLUSIONS

The employment of local or regional anesthesia requires some knowledge of anatomy. The skillful handling of patients by the hospital personnel, the surgeon and his assistants and the anesthetist tends toward the success of the procedures described. Any one member of the aforementioned team may interrupt the smoothness of the entire procedure, so that what should have been an "excellent" anesthetic result actually is only a "fair" result. Local or regional anesthesia, like other anesthetic procedures, has definite advantages and is governed by special indications; at the same time there are certain contraindications to its use. It is not, of course, the acme of perfection, but when judiciously used, combined with other methods if and when necessary, and its limitations respected, local or regional anesthesia is a valuable adjunct to the profession in general and to the specialty of anesthesiology in particular.

#### REFERENCES

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2. Labat, Gaston: *Regional Anesthesia; Its Technic and Clinical Application*, ed. 2, Philadelphia, W. B. Saunders Company, 1928, 567 pp.