

THE INDICATIONS FOR AND THE DANGERS IN THE USE OF SPINAL ANESTHESIA IN OBSTETRICS, GYNECOLOGY AND ABDOMINAL SURGERY*

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TWENTY-TWO years ago Bier, of Kiel, developed the technic of spinal anesthesia and demonstrated its value as an aid in surgical procedures upon the lower extremities. It was at once popularized by Tuffier who extended its application to operations upon the pelvic and abdominal organs. During this time it has been used with various degrees of satisfaction by surgeons all over the world. Some are enthusiastic about it, others denounce it in no uncertain terms. A study of the literature shows that the indications and contraindications are not clearly understood. Even those who are most enthusiastic have not made clear exactly why it is to be preferred to other methods of anesthesia under certain circumstances; nor has an earnest effort been made to educate the profession as to its advantages or dangers. That its use has slowly grown more popular and that those who have taken the trouble to develop a reliable technic and who have a healthy respect for its dangers still continue to use it, would suggest that it has earned a permanent place among anesthesia procedures.

When a new therapeutic or a new surgical procedure is discovered we are very prone to expect the unusual and sometimes the impossible. For this reason they are used as a last resort after all other means have been employed with failure or given without knowledge either of their true indication or physiologic action. If one attempts the use of spinal anesthesia only when some other anesthetic is contraindicated, unless he has had a good experience with it, he may be greatly disappointed and the experiment may be accompanied by disastrous results. We believe that no anesthetic has yet been discovered that is free from mortality either immediate or remote. A certain number of deaths occur suddenly on the table from all forms of inhalation anesthesia, whether it be ether or nitrous oxide. The percentage of deaths depends upon the skill of both the anesthetist and the operator. That there is a mortality and morbidity with which all forms of inhalation anesthesia have much to do, which occurs after the patient leaves the operating room is equally true. There is an interval here that still needs much study and careful observation in order to deter-

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mine how the credit must be shared between the shock and exhaustion incident to the anesthetic and that due to the surgical procedure minus the event of anesthesia, in patients who die from so-called exhaustion and shock within two or three days after an operation. Here lies one of the main points in the indication for spinal anesthesia in selected cases, and in a comparison of the dangers of its use this must not be overlooked. That death does not occur for forty-eight hours after operation in no way absolves a certain responsibility for any form of inhalation anesthesia.

The stimulating action of ether in the first half hour of anesthesia is readily observed in the flushed face, the rapid respirations, the increased pulse rate and the hot, moist skin. In patients who take the anesthetic badly, there is in addition, the suffused cyanotic skin of the face, the engorged veins, the stiff muscles and the forced respirations due to increased mucus, laryngeal spasm or obstruction as a result of falling back of the tongue, so that ether anesthesia produces a condition of activation and stimulation at first, which is followed later by the exhaustion which is certain to follow long continued overactivity. The later stages of prolonged anesthesia are characterized by lowered temperature, absence of the flushed skin of the early stages, skin drenched with perspiration, respirations that are shallow, and evidence of exhaustion. Many patients are not sufficiently supplied with a reserve force of energy to withstand an hour or two of such activation without exhaustion. Add to these effects of the anesthetic *per se*, the increased trauma on the part of the surgeon in overcoming the tense abdominal muscles, the tendency of the patient's respiratory movements to extrude the intestines through the incision, the increased amount of hemorrhage as a result of the stimulation, the overventilation of the lungs due to rapid breathing, the loss of fluid from sweating and postoperative vomiting, and we have the elements that contribute to shock. It is readily apparent that the increased heart action incident to the stimulation and rapid breathing during the stage of excitement leads to cardiac exhaustion and in a patient with a weak cardiac muscle the result is the same as it would be under forced exercise.

In spinal anesthesia, the blood pressure falls, the respirations become slow, the pulse rate is reduced, the heart is working slowly as a result of the lowered blood pressure against less peripheral resistance and the skin remains dry and warm. In no possible way could the heart be given a better rest for a certain definite period. If the patient has been properly prepared by the previous administration of scopolamine and morphine, she comes to the operating room indifferent and oblivious to her surroundings. There is no psychic trauma and consequently no expenditure of nervous energy. A patient with the

combined "Daemmerschlaf" and spinal anesthesia presents the appearance of one in hypnotic sleep, so that after an operation of one and one-half hours with all bodily activities subnormal and all traumatic impulses blocked, the patient has expended less energy than under normal conditions. In addition, there is perfect relaxation of the abdominal muscles and the contracted intestines lie quietly in the abdominal cavity. As a result of the low blood pressure, bleeding and troublesome oozing is much less. The conservation of energy that may be applied and which is often needed in the stress of postoperative recovery, the good condition of the patients after extensive severe operations, the lessened postoperative shock and discomfort with rapid recovery of strength, are all factors that lead to enthusiasm in the interested observer. It is by such a method that shock is reduced to the minimum and in our experience it has not only resulted in a lower mortality in certain cases, but it has led to a more rapid recovery with lower morbidity.

With the above important facts in evidence, certain groups of cases are at once suggested where spinal anesthesia is especially indicated. They include severe pelvic infections with dense adhesions, where the removal of the diseased structures is accompanied by profuse bleeding and an unusual degree of shock, and in fibroid tumors where the heart and entire musculature is weakened as a result of toxemia and hemorrhage. A similar condition is found in chronic gall bladder infections. In such patients there is usually a weakened heart muscle and often the general condition is much below par as a result of the infection and associated toxemia. In obesity accompanied by fatty degeneration of the heart muscle and where operation is often followed by pneumonia; in the early stages of an acute spreading peritonitis before the patient becomes saturated with the toxins of infection; the mortality of such a series of cases is still sufficiently high in every clinic to cause concern, and it is here that we have derived the greatest benefit from spinal anesthesia. That we have been able to operate safely many cases which die under the use of ether, leads to our enthusiasm and earnest effort to bring out if possible the advantages and dangers of this method, and lend what aid we can in placing it upon a safe and sound basis. It is in the above class of patients, the majority of whom are young or in middle life that should be operated without mortality. The heart muscle temporarily weakened from infection will entirely recover its normal if the cause is removed. It is definitely indicated in pulmonary tuberculosis and asthma.

It is dangerous where there are permanent changes in the arterial system which interfere with the normal elasticity of the vessels. It has been repeatedly stated that it is contraindicated after the age of sixty-five. It is dangerous here because of the drop in blood pressure

in arteries which do not have the power to adapt themselves to the changed condition on account of their inelasticity. It is not a matter of age. This may happen in one much younger if there is marked disturbance of the arterial tone, and on the other hand it can be given to a person much over sixty-five if the walls of the arteries are healthy. For this reason we avoid its use in patients with a high blood pressure, and where there are signs of the above mentioned arterial changes. For this same reason we avoid its use in patients who have an extremely low blood pressure. A blood pressure of eighty-five or ninety usually indicates a low vital resistance and it may be uncertain how much fall in blood pressure the patient may safely withstand. We must constantly bear in mind that surgery is contraindicated in some patients on account of the low vital resistance and that no form of anesthesia can be given without risk. We believe that a careful study of the arterial system together with a knowledge of the vital resistance is an important element in the successful use of spinal anesthesia because it is here the danger lies rather than in a sudden effect upon the respiratory center. With our present method, there seems little danger from this standpoint. We have avoided its use in patients desperately sick such as in general peritonitis and those in severe shock. The experience of those who used it during the late war would indicate that results were better in a comparative way than in other forms of anesthesia. Patients who are psychopathic or extremely nervous should not be given spinal anesthesia. Where there is a history of chronic headache its use is contraindicated for the reason that the patient may get the idea that this symptom has been aggravated. In syphilis especially when it in any way involves the nervous system spinal anesthesia should not be used because all symptoms which follow the operation are usually attributed to the operation and no doubt, in cases where paralysis of various forms have been reported following this method of anesthesia, careful study would have revealed syphilis as a cause instead of the anesthetic. We have made every effort to prevent accidents because we believe no unnecessary prejudice should be established against a method of such great value if given properly and with due regard for its dangers.

Spinal anesthesia is not free from danger, neither is any other anesthetic, even the simplest if not given with intelligence. It requires the greatest care always with attention to detail which includes careful study of the patient before its administration and constant attention by some one who is trained to observe the patient throughout the period of anesthesia. Unless, one is willing to subscribe to all these details, after having acquired a working knowledge of the method he should never be responsible for its administration. We have used it with the above principles in mind over a period of years. We believe that it is a special method which will eventually become part

of our armamentarium and will be used under special indications. It is folly to use it generally or to expect it to succeed when there are certain definite contraindications to its use or as a last resort. Surely we have reached the place where it is well known that we have no anesthetic which can be applied indiscriminately and that will meet all requirements. Many charts might be exhibited showing the marked difference in the reaction of the pulse and temperature following this method as compared with inhalation anesthesia. This would consume time and fill valuable space and after all would in no way convince any one who may be skeptical. This is all strikingly demonstrated at the bedside. In our last 1000 major gynecological operations exclusive of five deaths of peritonitis which were caused by imperfect sterilization, in one instance contaminated water, in another improperly prepared gloves, our mortality has been seven-tenths of one per cent. This included many bad risks, some of whom could not possibly have been operated safely by any other method. We are pleased with the result and feel that our mortality has been distinctly lowered.

We have had two fatalities in a series of 1500 cases. The first occurred in a case of eclampsia in a primipara with contracted pelvis where cesarean section was necessary. The patient had several convulsions before the operation and was seized with a convulsion almost immediately after the anesthetic was introduced. Death occurred suddenly from cessation of respiration in spite of all efforts of resuscitation. While the condition of the patient was not good and there may be a possibility that she died from the convulsion, I have no doubt that the death was due to the sudden change in the spinal fluid which carried the anesthetic immediately up the canal to the medulla. Little is known about the spinal fluid at best, but that it is greatly disturbed in the paroxysm of a severe eclamptic convulsion is undoubtedly true. I would say that spinal anesthesia is definitely contraindicated in the presence of any form of convulsions. The second case was a patient who had been ill for ten weeks with a severe puerperal infection, where operation was undertaken as a last resort and where one would be almost certain of death with any method of procedure. She had a blood pressure of only 80 before blood transfusion which brought it up to 90. It may be recorded as a foolhardy attempt at the impossible. It was interesting from the standpoint of emphasizing the danger where there is low vital resistance with extremely low blood pressure. Before giving the anesthetic, we had placed a cannula in the vein and had given a solution of adrenalin almost immediately. As soon as anesthesia came on, the blood pressure fell and continued to fall without any response to all stimulation. It was a striking example of death from fall in blood pressure in a patient who had no reserve force in the vessel walls upon which to draw in such an emergency.

These deaths in no way change our views about spinal anesthesia. It should never have been given to either of these patients. We learn from mistakes and they should be recorded. It is the only way progress may be attained, but these deaths should not be charged against the method without reference to the condition of the patient at the time of operation. We are entirely satisfied that we have been able to operate upon patients successfully where it would have been impossible under any other form of known anesthesia today, and that our mortality has been materially lowered in the class of cases above mentioned among the indications for its use. We are so thoroughly convinced of this fact that we desire to throw every safeguard about it and offer our experience in such a way that those who may be interested may approach it in a sane manner and without prejudice.

We have always used novocaine because it is the least toxic of all effective local anesthetics. We give 2 c.c. of an 8 to 10 per cent solution in water which has been trebly distilled. To this is added 4 minims of absolute alcohol. The solution is made fresh and boiled just before its introduction. All instruments used are also boiled in distilled water so that all danger of chemical irritation is avoided. We believe it is of the greatest importance to be sure about the technic and all details in order to avoid the danger of infection. If this practice is carefully followed, headaches will seldom occur. This is a sequel often mentioned and given as a criticism of the method. Wherever headaches have occurred, it has been due to some error in technic. At one time a number of headaches in a series of cases caused us to make a thorough examination which revealed the fact that we were using distilled water which was contaminated with some inorganic matter from a defective still. Since that time, we have used a small glass still and this water is always freshly distilled just before use. Some dissolve the novocaine in the spinal fluid. We have hesitated on account of the danger of infection from imperfectly sterilized novocaine. No other untoward symptoms such as local paralysis have been observed. We aim in every way to avoid psychic shock and all mental excitement or disturbance by careful preparation of the patient for anesthesia. Two hours before operation, a hypodermic of scopolamine gr. $\frac{1}{200}$ and morphia gr. $\frac{1}{8}$ is given. Thirty minutes before the scheduled time a second hypodermic of morphia gr. $\frac{1}{8}$ is administered. The patient is then brought to the operating room in a comfortable sleepy condition which renders even the most nervous individual free from fear and excitement. Ears are plugged with cotton and the eyes blind-folded and all unnecessary talk and noise forbidden in the operating room. With the additional fall in blood pressure, the patient often goes to sleep and does not regain interest in her surroundings until the operation is ended. All "grandstand" performance such as allowing patients to witness the proceed-

ings, reading, smoking, etc., are not allowed. Before they are sent back to the ward another hypodermic of morphia is given to control the pain, the onset of which is somewhat sudden and may be severe after the effect of the anesthetic passes away. We never place our patients in the Trendelenburg position because we believe it increases the danger. We do not as yet know exactly what may happen in the spinal fluid under all circumstances and I have seen trouble in the hands of other men which I thought was caused by the extreme Trendelenburg position.

CONCLUSIONS

Increased experience leads us to the same conclusions stated in a paper before this Society five years ago. The freedom from nausea, abdominal distention, postoperative weakness and other disturbances so common with other forms of anesthesia recommend it as an improved method for cases when given under proper supervision and with full knowledge of its danger. We believe this method to be worthy of careful consideration on the part of every progressive surgeon who is willing to spend the time and care which are necessary in order to achieve success. Spinal anesthesia is the best anesthetic known today for certain operations in the lower abdomen. It should be given only after careful study of the patient. If it is not properly employed by one possessing sufficient skill, it may have a large mortality. There is no form of anesthesia which is altogether free from danger either immediate or remote. There are well defined contraindications to the use of all anesthetics in certain instances, and the operator must exercise considerable judgment as to which anesthetic should be employed in a given case.

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(*For discussion, see p. 433.*)