

## FIFTEEN YEARS EXPERIENCE WITH SPINAL ANESTHESIA\*

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After fifteen years experience with spinal anesthesia we have come to the following conclusions: First, spinal anesthesia has a very definite place in surgery; second, in a large number of cases it is the only anesthesia that makes an operation possible and safe in that particular case. (I am referring to cases such as stomach resection, operation upon the large bowel, prostatectomies and any operations on seriously shocked patients, where general anesthesia would have to be too prolonged to be considered safe and where the field of operation would be rather extensive and the discomfort to the patient too great for local anesthesia); third, spinal anesthesia is becoming more and more generally used and my prediction is that it will become a method of procedure used with considerable regularity in our hospitals before many years; fourth, spinal anesthesia as we have now learned to use it, is reasonably safe; fifth, it has certain advantages in certain cases that cannot be obtained in using ether, nitrous oxide, ethylene or local anesthesia.

In these fifteen years we have had 152 cases, with 2 fatalities. These occurred during the present

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year, 1928, and both were due to errors in technic which can be avoided. We operated on our first case under spinal anesthesia in 1913, using stovaine. We then went to apothesine and finally to novocain. Novocain is the only drug we have ever felt satisfied with. We consider it safe.

As to our method. Until recently we have had the patient sitting up on the operating table, feet resting on a stool, back arched. We locate the fourth lumbar vertebra by stretching a sterile towel between the two iliac crests and marking with our finger nails where this towel crosses the spinal column. This area has been previously sterilized and painted with iodine and shows a finger nail marking very clearly. We then decide which space we will enter in doing our spinal puncture.

For all work on the extremities and perineum we go into the fourth lumbar space. For hernias and work in the inguinal region, the third space. For other work below the navel but above the inguinal region, such as appendectomies and pelvic work, the second space. We have never given spinal anesthesia above the first lumbar space, that is, between the twelfth dorsals and last lumbar spines. We have never attempted to do work above the diaphragm under spinal anesthesia.

We have been able to explore the entire upper abdomen, including the diaphragmatic surface of the liver and spleen and to do operations on the stomach and gallbladder without the slightest discomfort to the patient by using the first lumbar space. Why go higher? This use of the different lumbar spaces is not absolute. In general we use the lowest space for the lowest anesthesia desired

but do not hesitate to go to a higher space, if it is easier to enter with the needle. We have not knowingly, however, gone above the first lumbar space.

Until March, 1928, we induced spinal anesthesia by dissolving novocain crystals in the spinal fluid and injecting the same. About this time we received a solution put up by Merck & Co. and used by Dr. Geo. Pitkin of Teaneck, New Jersey. We were so impressed with his results that since that time we have been using this solution which is now put out by Merck & Co. under the name of spino-cain. Our technic is as follows:

The preoperative preparation of the patient is simple. A light supper the night before. No food the morning of the operation; one-sixth grain of morphine two hours before and repeated one hour before the patient goes to the operating room.

In the operating room quiet prevails. Patient's ears are stuffed with cotton and a wet towel is placed over the eyes.

The operating table is always arranged with the head lower than the foot. The patient lies on the table on his side, head slightly lower than the rest of the body. The spine is prepared in the lower dorsal and lumbar region. Ampule No. 1 of the spino-cain solution is opened and injected with a small caliber needle and small hypodermic into the skin and then into the deeper tissues in the lumbar space in which we intend to make our puncture. A nick is then made in the skin with a scalpel and the spinal needle is slowly introduced, feeling its way along between the spinous processes until the dura is entered. About thirty drops of spinal fluid are allowed to flow from the needle.

Then the syringe containing spinocain solution No. 2 is attached to the lumbar puncture needle. More spinal fluid is allowed to flow out and mix with the spinocain solution and the mixed solution slowly injected into the spinal canal. The needle is then withdrawn, a piece of adhesive placed over the punctured opening and the patient turned flat on his back. By the time the field of operation is prepared one is ready to proceed with the operation.

The spinal puncture needle should be small. No. 22 gauge is preferable and it should be bevelled. It is small to prevent postoperative leakage of spinal fluid and subsequent headaches, and bevelled so as to enter the dura, leaving a trap door flap for a more perfect closure when it is withdrawn and bevelled so as not to injure the structures of the spinal cord.

As to the solutions. No. 1 is introduced for local anesthesia in the skin so as to make lumbar puncture a painless procedure and, inasmuch as it contains ephedrine, it prevents the fall in blood pressure which heretofore has been so marked and has made spinal anesthesia so dangerous.

The thirty drops of spinal fluid are allowed to drop from the needle so as to equalize the pressure within the canal. After attaching the syringe containing solution No. 2, about 5 to 10 c.c. of spinal fluid are drawn forth, providing we wish to do upper abdominal work and, therefore, disseminate our solution further up and down the cord. The more spinal fluid we draw forth, the higher up we will carry our anesthesia. This is further regulated, however, by the position of the patient on the table.

The head of the table should always be lower than the foot. Trendelenberg position is most suitable in spinal anesthesia with this solution which is lighter in specific gravity than the spinal fluid. For the highest anesthesia, namely upper abdominal work on the stomach and gallbladder, the head of the table is raised so that it is almost level with the foot.

Anesthetist assumes his position at the head of the table with a blood pressure apparatus and makes his observations on the pulse, blood pressure and general condition of the patient as the operation proceeds. If the patient's mind is on the operation (and you may be sure it generally is), it is the anesthetist's duty to divert it with appropriate conversation. This, to my mind, is a factor of great importance, especially with women patients. They are apt to get in an extremely nervous state, if allowed to lie there and imagine what is happening to them.

This paper would be incomplete if we did not compare spinal anesthesia with other methods.

First, as to local anesthesia. Nothing is safer than this, but spinal anesthesia does have some advantages over local. The patient is more comfortable under spinal. The anesthesia is more complete and, if the patient's mind can be gotten off the operation, he is an ideal operative case both to himself and to the surgeon. In spinal anesthesia there is absolutely no pain. In local there is apt to be considerable discomfort.

Compared with nitrous oxide and oxygen. Under spinal anesthesia the patient does not lose consciousness. Also, his relaxation is complete under spinal.

Under nitrous oxide and oxygen and under ethylene and also under local the relaxation is most incomplete, and anyone who attempts to operate without relaxation knows that the simplest operation can be made the most difficult under these conditions. And, further, after anyone has operated with the complete relaxation one gets under spinal, he is never willing to give up this method of anesthesia.

*Spinal anesthesia is indicated in the following cases: First, patients with bad hearts, bad kidneys or bad lungs, where the danger of general anesthesia is more than that of the operation itself; second, cases which are too extensive for local anesthesia and not suitable for general, such as old people needing an amputation, prostatectomy, work on the large intestine or stomach resection, intestinal obstruction, etc.*

Spinal anesthesia may be used in the following cases: First, all operations below the diaphragm. It is true that occasionally we do not get the complete anesthesia we expect from spinal or we find that it does not last throughout the entire operation. There is, then, no contraindication to giving a little ether or gas. We must remember that we are not attempting to do a "stunt" when we use spinal anesthesia, but are aiming to do an operation under safer conditions for the patient than it could otherwise be done. If the method does not fulfill its expectations in any particular case, we should not feel disappointed in the method because we have to reinforce it with some other method of anesthesia.

Let me emphasize again that spinal anesthesia is

more difficult in women patients than in men. It is here that the importance of having a good conversationalist at the head of the table is quite evident.

Finally, I would caution against the indiscriminate use of spinal anesthesia. As stated before, I consider it a lifesaver in certain cases and the only method under which certain operations could be attempted with safety, *but to use it as a routine measure for all operations below the diaphragm or even for operations below the navel or on the lower extremity is all wrong.* It is wrong because the mortality of spinal is not yet proven to be as low as that of local anesthesia, gas, or oxygen and ether.

We have used spinal anesthesia in the following cases since January, 1928.

1. Jan. 24, 1928, herniotomy.
2. Jan. 24, 1928, herniotomy.
3. Feb. 24, 1928, herniotomy.
4. Feb. 27, 1928, herniotomy, femoral.
5. Feb. 28, 1928, herniotomy, ventral.
6. March 13, 1928, herniotomy.
7. March 13, 1928, resection of bowel.
8. March 13, 1928, herniotomy.
9. March 19, 1928, gastroenterostomy.
10. March 26, 1928, cholecystectomy, appendectomy.
11. March 26, 1928, herniotomy, left inguinal.
12. March 28, 1928, cholecystectomy.
13. March 27, 1928, resection stomach and posterior gastroenterostomy.
14. April 3, 1928, appendectomy.
15. April 6, 1928, gastroenterostomy.
16. April 6, 1928, herniotomy, bilateral, orchidectomy.
17. April 9, 1928, herniotomy, appendectomy, cholecystectomy.
18. April 9, 1928, appendectomy.
19. April, 16, 1928, herniotomy, double.
20. April 18, 1928, prostatectomy.

21. April 19, 1928, intestinal obstruction due to umbilical hernia.
22. April 26, 1928, herniotomy, right inguinal.
23. May 14, 1928, exploratory laparotomy.
24. May 21, 1928, appendectomy.
25. May 28, 1928, general peritonitis.
26. May 28, 1928, subhepatic abscess.
27. June 11, 1928, herniotomy, inguinal.
28. June 11, 1928, herniotomy, umbilical and inguinal recurrence.
29. June 5, 1928, ruptured gallbladder.
30. June 16, 1928, ruptured gallbladder.