ANÆSTHESIA IN RECTAL SURGERY.

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It will be convenient to divide the operations upon the rectum and anus into three groups, viz.: anal, rectal, and abdominal, for the purposes of classification from the anæsthetic standpoint. The first group includes all the surgery of the anal canal, e.g., fistulæ, fissures, piles, and abscess; the second refers to the rectum from the perineal aspect, e.g., prolapse and perineal excision; whilst the third group includes the operations of perineo-abdominal excision and colostomy. These three groups lend themselves to widely differing methods of anæsthesia, which may be divided into three groups, (a) Spinal, (b) General, and (c) Local, or their combination.

SPINAL ANÆSTHESIA.

Spinal anæsthesia has been subject to much criticism in the past, and there are many who still look upon this method with disfavour. In days gone by this attitude was justifiable, but now the technique is much improved, and the selection of drugs is much wider, so that it is possible to control the height and time of anæsthesia very accurately indeed. By means of suitable technique one can obtain low, medium and high spinal anæsthesia.

Much has been made of psychic shock and mental distress with regard to spinal anæsthesia, and it is the writer's opinion that this can occur. But if the patient is given suitable premedication, and his confidence has been gained, no harm will result. It is undesirable to allow a patient to remain conscious while he is in the Trendelenberg position, or if the operation is likely to last more than half an hour. Some modification must be made in this latter statement, however, for it is obviously unnecessary to give a patient nitrous oxide and oxygen to produce unconsciousness if he is so well doped that he is quietly sleeping whilst the operation is in progress.

In the past it was not unknown for the patient to have a big fall in blood pressure, and in some cases the constitution was unable to withstand this fall, with disastrous results. Nowadays this is happily a thing unknown, for the blood pressure can be controlled very satisfactorily with ephedrine. Post operative headache, too, is very rare indeed after low spinal anæsthesia, and even is met with seldom in the case of medium and high spinal block. There is now no fear of the anæsthetic wearing off as used to happen occasionally in the past. In fact, it is the writer's opinion that for operations on the anus the "low spinal" method gives results second to none, and the use of high spinal anæsthesia, in combination with nitrous oxide and oxygen, for the perineo-abdominal type of operation causes least disturbance to the patient. Indeed, patients frequently leave the operating table at the end of two hours with an unaltered pulse.

It is not the writer's intention to enumerate all the drugs used in spinal anæsthesia, but to mention those which have been tried and found satisfactory in his hands. Ethocaine (Procaine) has been found to give excellent results in minimal doses for low spinal technique, and it works equally well for the medium technique, but it will not be wise to expect more than forty-five minutes to one hour's duration

of anæsthesia with this drug. The effect on blood pressure in the low spinal is nil, and there is very little effect if ephedrine be used as well in the medium spinal technique. For operations likely to last more than an hour we prefer to use percaïne 1 in 1,500 by Wilson's⁽¹⁾ timed technique.

Before describing the technique of injection it will be well to consider the innervation of the viscera it is desired to render anæsthetic.

It will be remembered that the perineum and the muscular structures in this area, including the sphincter ani and the sphincter urethræ, are supplied by the 2nd, 3rd and 4th sacrals. The levator ani also is supplied by these nerves. Thus it is easy to obtain a limited anæsthesia of the anus, anal canal, and lower rectum.

The peritoneum of the pelvic floor and rectum in its upper part derive their innervation from the hypogastric plexus, whose upper limit is the 10th dorsal. In order to be certain therefore of complete anæsthesia, when performing such operations as recto-sigmoidectomy and perineal excision of the rectum, anæsthesia to the level of the umbilicus is advisable. The operation can, however, frequently be performed when the level of anæsthesia is no higher than the 12th dorsal.

When opening the abdomen it is more convenient to aim at anæsthesia from the 7th dorsal, which in practice usually means a nipple line anæsthesia. In the case of low spinal block it should be remembered that anæsthesia of the perineum is often associated with blunting of sensation of the sole of the foot. This of course is due to the fact that the 2nd and 3rd sacrals are partly responsible for the nerve supply in this area.

Contra-Indications to Spinal Anæsthesia fall into two groups (a) vascular, (b) neural. Into the vascular group comes hæmorrhage, anæmia, and low blood pressure from any cause, such as Addison's disease. On the other hand, a high blood pressure associated with advanced atheroma is also a contra-indication, as is also advanced myo-cardial degeneration. In the neural group are ranged tertiary syphilis, general paralysis of the insane, tabes, disseminated sclerosis etc.

Complications of Spinal Anæsthesia. Headache is seldom seen in low spinal anæsthesia, but it does sometimes occur in high spinal block. Prevention is better than cure in this case, and the best way to prevent headache is to raise the foot of the bed on 6 inch blocks immediately after operation, and to keep the patient in this position for 8 hours or so. Treatment ranges from aspirin and phenacetin in mild cases, to spinal puncture and/or subcutaneous injection of adrenalin in severe cases.

Bladder troubles fortunately are rarely seen with low spinal block, but with the high spinal anæsthesia the bladder has to be watched carefully. Catheterization is rarely required, however, and then only for a day or so. In one case during the last year it was found necessary to catheterize a patient for a week following the operation.

Paralysis is said to occur on occasion, but we have been spared this experience in our own practice.

We have noticed that patients sometimes complain of pain in the thighs following spinal anæsthesia for perineal excision, but this has only lasted a few hours.

Low Spinal Technique with Minimal Dosage of Ethocaine (Procaine).

For anal operations (piles, fissure, etc.) this is best performed with the patient sitting up so as to limit the sphere of action of the drug.

The apparatus required is simple, and is enumerated below:

- (a) A hypodermic syringe of 2 c.c.s capacity.
- (b) One hypodermic needle.
- (c) Two Howard Jones spinal needles.
- (d) One ampoule containing 25 mgms. of sterile ethocaine crystals.

The Howard Jones needles have a short bevelled point and are of thin gauge wire in order to prevent seepage of cerebro-spinal fluid as much as possible.

The patient is placed in a sitting position with the elbows on the knees and the head supported in the hands. This arches the back well and separates the spines of the vertebræ. The patient is warned that he will feel a cold sensation on his back, which is cleaned with spirit in the area round the lower lumbar vertebræ. It is advisable to hold a wool swab at the tip of the sacrum to prevent any spirit running down to the anus.

A line is made across the upper part of the back with mastisol on a swab, and a towel with a small central hole is applied to the back and is held in place by means of the mastisol on the skin. Having verified the bony landmarks, a wheal is made intradermally with 2% ethocaine between the 3rd and 4th lumbar spines, and more ethocaine is injected at right angles to the vertebral column. A spinal needle is then inserted through the skin forwards and at right angles to the vertebral column. The stilette is removed and the needle slowly advanced until a snick is felt and the cerebro-spinal fluid drips out from the needle's end. Sometimes this snick is not felt and caution must be used in advancing the needle tip forwards, otherwise it is quite possible to touch a nerve root momentarily, with consequent distress to the patient. Should the needle strike bone it should be withdrawn until the point is just beneath the skin and then it should be re-inserted at a slightly different angle, either in a higher or lower direction.

The 2 c.c. syringe is attached to the needle and 1 c.c. of cerebro-spinal fluid withdrawn. Sometimes the fluid cannot be sucked into the syringe even though it has dripped through the needle quite well. In this case it is necessary to rotate the needle until the cerebro-spinal fluid can be sucked out easily.

The cerebro-spinal fluid withdrawn is injected into the ampoule containing 25 mgms. of ethocaine, which readily dissolves, and the resultant solution is returned into the spinal canal. There is no need to inject this very slowly, but it is advisable to take about one second over the injection. The needle and syringe are withdrawn together, and the patient is asked to sit upright for two minutes. At the end of this time he is allowed to lie down, and it is well to remind him that the only part of his body which will be insensible to pain is that part which is going to be dealt with. Patients often think that they will be numb from the umbilicus down, and it is well to reassure them that although they will feel no pain they may be conscious of touch.

This technique gives anæsthesia of 2nd, 3rd and 4th sacrals, and enables any operation on the perineum, scrotum, and penis to be performed.

Anæsthesia will last adequately for one hour.

Medium Spinal Anæsthesia.

Operations upon the rectum, (for complete prolapse, perineal excision, etc.) necessitate a larger dosage of ethocaine and a larger quantity of cerebro-spinal fluid as solvent.

The patient in this case is placed on the left side with the knees drawn up and the head well flexed, so as to arch the back. The same technique as mentioned above is used, but in this case we use 150 mgms. of ethocaine and $2\frac{1}{2}$ c.c.s of cerebro-spinal fluid to act as solvent. Two seconds should be taken over the injection of the anæsthetic solution, and as there is the possibility of some fall of blood pressure it is advisable to inject ephedrine grs. $1\frac{1}{2}$ intra-muscularly at the same time. As soon as this is completed the patient is turned over upon his back with the knees and thighs flexed.

This dosage produces anæsthesia up to the level of the umbilicus, the duration of which is seldom more than 45 min. to 1 hour, but this time as a rule suffices for any of the usual operations upon the rectum, from the perineal aspect.

High Spinal Anæsthesia.

This technique is employed for the third group of operations, viz.: perineo-abdominal excision of the rectum, and those procedures necessitating the opening of the abdomen.

The method adopted in this case is one suggested by W. Etherington Wilson⁽²⁾.

As a longer time is required for the operative procedure than ethocaine provides the anæsthetic employed is 1 in 1,500 percaine, which usually gives 2 hours anæsthesia with ease.

The necessary apparatus consists of a 2 c.c. syringe, one 20 c.c. glass syringe, one hypodermic needle, and two Howard Jones needles, a bowl of hot water at 110° F., one ampoule of 1 in 1,500 percaine, and one Eastman timer.

A glass syringe is recommended because the metal piston in a record syringe is apt to stick, owing to differences in the coefficient of expansion of metal and glass. Etherington Wilson found that the diffusion of percaine was much hastened when injected warm. He also found that it was possible to time the rate at which this diffusion took place while the patient was in the sitting posture. This method has been found extremely satisfactory in practice, and it is described in detail below.

The patient is placed sitting up as in the low spinal method, the skin is prepared, and the needle inserted into the spinal canal. Having made sure that the cerebro-spinal fluid is flowing easily the stilette is replaced in the needle and the ampoule of percaine opened. The 20 c.c. syringe and the ampoule of percaine should have been standing in a bowl of water at 110° F. for at least 5 mins. before the spinal puncture is begun. The syringe is charged with 14 c.c. of the 1 in 1,500 percaine. The nurse starts the timer when the syringe is attached to the needle and the injection is begun as the second hand commences its journey round the dial. 30 to 35 seconds is taken to inject the full 14 c.c., and the needle and syringe are withdrawn together immediately the injection is finished. At 45 seconds the patient is warned that he will be placed flat on his back almost immediately, and as soon as 50 seconds have passed he is rapidly placed in the dorsal position and the table tipped to a 5 degree Trendelenberg.

Anæsthesia is usually complete in from 5 to 7 minutes, but is definitely slower in onset than with ethocaine. It may take 10 minutes for full anæsthesia to supervene, but by the time the towels are applied to the patient's abdomen, and everything is ready for the operation to begin, the anæsthesia is usually found to be complete.

The blood pressure is controlled by the use of ephedrine grs. $1\frac{1}{2}$ as before. Sometimes a "20 minute fall" is seen, with its concomitant nausea and retching, but if the patient is kept unconscious with gas and oxygen this seldom happens, and the even tenor of the anæsthesia is unaltered.

It is found in practice that the pulse rate scarcely alters during the whole time of operation, which shows that the blood pressure fall has not affected the circulation.

PREMEDICATION.

Many methods are available, but those which we use routinely are enumerated below:—

For the low spinal technique the average patient receives omnopon gr. $1/3$ and scopolamine gr. $1/150$, hypodermically half an hour before operation.

The medium and high spinal patients, on the other hand, receive morphine gr. $\frac{1}{4}$, hyoscin gr. $1/150$, hypodermically one hour before operation, together with nembutal gr. $1\frac{1}{2}$ given orally one hour before. If the patient is not much affected by this it is possible to give a further dose of morphine gr. $\frac{1}{8}$.

By this means the patient is rendered drowsy and can be easily controlled with gas and oxygen. The breathing whilst under the anæsthetic is akin to that of natural sleep, and thereby the surgeon is not impeded by rapid and big respiratory movements as with ether anæsthesia. In this wise it is possible to cut down the operating time, and the risks of consequent chest complication by the use of ether are avoided.

In the past we have used avertin as a means of premedication, but for operations upon the rectum it is inadvisable owing to the fact that there is always some fluid left in the rectum which may leak out. It has been given through the colostomy opening, but in our opinion the blood pressure fall is far greater when given by this route.—We do not recommend the use of avertin with spinal block.

Spinal Emergencies are fortunately now rare, but they have occurred in the past and some discussion of their treatment may be found useful.

These emergencies are of a two-fold nature, circulatory and respiratory. Circulatory failure owing to a big fall of blood pressure sometimes occurs with the high spinal block, and can best be treated by the intravenous injection of coramine 5 c.c. or cardiazol 3 c.c. followed by an intravenous injection of saline and glucose. Bandaging the lower limbs also helps considerably, and the administration of oxygen with 7% carbon di-oxygen will help further by increasing the pumping action of the chest.

Respiratory failure owing to too high an anæsthesia is fortunately rare, but when this occurs artificial respiration is necessary until the spinal anæsthesia begins

to wear off. There is, however, another form of respiratory emergency which has been noticed by the author in the past, although it has not been seen whilst using the techniques described above. There is a sudden onset of respiratory embarrassment, and all the accessory respiratory muscles come to the aid of the intercostals and diaphragm in a vain effort to get air in and out of the chest. Laryngoscopic examination shows the cords wide apart and yet it is obvious on attempting artificial respiration that no air enters or leaves the lung. The condition has been found to yield to prompt intravenous or intracardiac injection of adrenalin. In some cases broncho-pneumonia has supervened some twenty-four hours later. Whether these alarming symptoms are due to interference with the sympathetic nerve supply to the lung and are akin to asthma, or whether they be due to some direct toxic action of the spinal drug, remains to be seen. Fortunately the writer has only seen this occur very rarely.

GENERAL ANÆSTHESIA.

General anæsthesia may be used for all anal and rectal operations, and of general anæsthetics nitrous oxide and oxygen, with suitable premedication, is the method of choice.

It is neither necessary nor desirable to have the patient so deeply anæsthetized as to obtain paralysis of the sphincter ani. The injection of proctocaine into and around the sphincter ani as recommended by C. Naunton Morgan gives ample relaxation of the sphincter enabling nitrous oxide and oxygen anæsthesia to be maintained easily. In this case we recommend for premedication in adults omnopon gr. 2/3, scopolamine gr. 1/150, but intravenous evipan combined with omnopon gr. 1/3 and scopolamine gr. 1/150 may be used as an alternative. This premedication is very satisfactory indeed when combined with the injection of proctocaine and the use of nitrous oxide and oxygen to complete the anæsthesia.

Local anæsthesia is quite satisfactory for the removal of piles and for dealing with fissures in ano. The anæsthetic employed in this case is proctocaine, and has been fully dealt with elsewhere by Naunton Morgan⁽²⁾. Caudal and parasacral block are unnecessary and take too long. Patients resent the many pricks required for the latter.

CONCLUSIONS.

(a) For operations around the anus low spinal anæsthesia with ethocaine in minimal doses is safe, easy, and has no after effects. General anæsthesia (nitrous oxide and oxygen) may be used equally satisfactorily when combined with adequate premedication and the local injection of proctocaine.

(b) For perineal excision of the rectum, perineo-abdominal excision of the rectum etc., spinal anæsthesia in combination with nitrous oxide and oxygen is the method of choice. There is less post-operative discomfort and less shock. The use of a general anæsthetic, by obliterating consciousness, apart from being kind to the patient, is useful in that the fall of blood pressure passes unnoticed by the patient, and the concomitant nausea does not occur.

(c) Spinal anæsthesia is safe provided that the patient is properly prepared, and is a fair operative risk, provided the technique is sound.

REFERENCES.

1. W. Etherington Wilson. *Brit. Journ. Anæsth.*, 1934, xi, 43. *Proc. Roy. Soc. Med.*, 1934, xxvii, 323.
2. C. Naunton Morgan. *Brit. Med. Journ.*, 1935, ii, 938.