

formed on normal tissues, or if it is necessary to reach very deep organs (laparotomy, opening of deep abscesses), the author recommends applying infiltration anesthesia in the usual way, following the line of incision. This method saturates all the tissues with rivanol-novocain solution and forms an antiseptic barrier some distance from the border of the incision.

(2) If the surgeon has to deal with traumatized tissues and already infected wounds, the technic of local infiltration must be different. It is advisable to form an antiseptic barrier around the wound and a greater distance away from the edges of the wound. The next step is to infiltrate the tissues toward the wound. That increases the flow of fluid from deep to superficial layers, and mechanically washes out bacteria and toxins which have previously formed in the open wound. The bottom of the wound must be infiltrated with particular care.

When novocain-rivanol solution is used, the skin turns a very unpleasant-looking black color, but all the deep tissues become yellow (lemon-colored), well localizing the field of operation; this helps to separate the anesthetized region and makes orientation much less difficult.

CONCLUSIONS

(1) Anesthetizing properties of rivanol-novocain solution clinically do not differ from the usual novocain solution.

(2) Rivanol-novocain anesthesia in the above-mentioned concentration does not make any deleterious changes either in the place of local injection or in the general condition of the organism.

(3) Rivanol-novocain anesthesia is best recommended in prophylactic preparation of the wound, but its use is very valuable in all patients when there is a chance of postoperative wound infection.

(4) Encouraging results obtained with the use of this solution call for further study of the possibility of using many other antiseptics.

(5) Because of the antiseptic properties of the solution, this method of infiltrative anesthesia ought to be of wide use in military surgery, particularly in war time.

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CORLETTE, C. E.: *Fifty-five Cases of Radical Operation for Cancer of the Breast under Local Anaesthesia, with an Account of the Technic.* M. J. Australia 2: 427-430 (Nov. 2) 1940.

"I have now performed 55 of these radical breast operations under local anesthesia from beginning to end. . . . In no case has it been necessary to call in the aid of a general anaesthetic. . . . While the thirty-five minutes or so taken by the injections are tedious, and much longer than the time taken for the induction of ether anaesthesia, there is a set-off in the lessening of the time taken for the actual operation, and therefore an economy of time to the surgeon when the injections are undertaken by an assistant. That is because of the haemostatic influence of the injections, at least as employed in the series here concerned. While cases occur that keep one busy with haemostatic forceps, the tendency to haemorrhage is not so great as is commonly found in patients under ether anaesthesia. . . . In these and other operations efficient premedication is a fundamental preliminary to the whole procedure. . . . A properly conditioned combination of morphine and hyoscine affords us nearly all we want. It is not perfect, but it is very good. . . .

"For the analgesic drug I have invariably used ethocaine, given in association with a 1 in 200,000 solution of adrenaline. I always use the name 'ethocaine' in preference to 'procaine,' its pharmacopoeial synonym, because 'procaine' is a dangerous name that

ought to be dropped. It has been responsible for many fatal accidents. That is because the name, if indistinctly heard, is easily confused with 'cocaine,' and cocaine is at least five times more toxic. Moreover, 'procaine' and 'Percaïne' sound deceptively similar, and in handwriting it may be impossible to decide which was meant. 'Percaïne' is at least as toxic as cocaine. 'Percaïne' is 'nupercaïne' in America, and (I think) in South Africa. On the telephone, it may be difficult to distinguish between 'nupercaïne' and 'Novocaine,' 'Planocain,' and 'Kerocain' are proprietary brands of ethocaine. One brand may cost less or more than another, but that is all. The solution to be injected should be isotonic. . . .

"Before coming to the injections it will be profitable to sketch some of the surgical anatomy. Local anaesthesia technic, as I have tried to develop it, has always had a double aim—control of pain first, of haemorrhage next. This is made possible by utilizing the ethocaine for analgesia, and the associated adrenaline for ischaemia. The double aim has useful applications in the breast operation. We note, therefore, a nerve supply through derivatives of the brachial plexus to muscles connected with movements of the shoulder, such as the two pectorals, the latissimus, and the subscapularis. The cutaneous nerve supply is derived from the intercostal nerves, excluding the first, but a further cutaneous supply proceeds from descending branches of the cervical plexus, reaching as far as the third rib. With proper care the whole of these nerve paths can be effectively blocked. Blood supply from behind comes through the intercostal arteries, which give off muscular branches (some of which go to the pectoral muscles), lateral cutaneous, and mammary, the mammary branches being derived from the arteries of the third, fourth, and fifth spaces. Blood

supply medially comes from the internal mammary artery, chiefly through its second, third, and fourth perforating branches. These all give branches also to the pectoralis muscle and the skin. From above come, firstly, the pectoral branch of the thoraco-acromial, which runs between the two pectoral muscles, giving supplies to both, secondly, the lateral thoracic, an important vessel giving supplies to axillary contents, pectoral muscles, and lateral part of breast, and then, thirdly, comes the thoraco-dorsal continuation of the subscapular, near the axillary border of the scapula. Some control is possible over most of these vessels, results being better in some than in others, but appreciable always.

"The technic is designed to meet the indications disclosed by the anatomical survey. The following solutions are prepared: (1) for brachial plexus block, 30 mils [cc.] of 2 per cent ethocaine in 1 in 200,000 adrenaline and 0.55 per cent sodium chloride solution; (2) for intercostal nerve blocks, 120 mils of 0.75 per cent ethocaine in 1 in 200,000 adrenaline and 0.8 per cent sodium chloride solution; (3) for all the rest of the injections, 200 mils, 250 mils, or more (according to the size of the patient) of 0.5 per cent ethocaine in 1 in 200,000 adrenaline and 0.8 per cent sodium chloride solution. These solutions are placed in glass beakers suitably marked for identification. . . . With the patient lying supine, on a well-padded table, the brachial plexus block is carried out. . . . A second table is now placed beside the original one, of the same height. The patient is carefully rolled on to it, into a prone or nearly prone position. The arm is placed so as to keep the scapula well away from the midline. The prominence of the spinous process of the seventh cervical vertebra is identified. This corresponds with the level of insertion of

the needle for blocking in the first intercostal space. From this point a line is marked downwards as far as the eighth rib at a distance three fingers' breadth from the midline. . . . The fluid disperses into the space containing nerves and vessels, blocking pain sense in the nerves, and causing ischaemia in the arteries and veins. The needle in the first space is now withdrawn, while the second remains in place as a guide to the third. In this way the injections are repeated as far as the seventh. In a few cases the eighth space has been injected, but it confers no advantage. . . . When the posterior intercostal injections are finished, the patient is rolled back onto the first table again, into a supine position, for the remaining injections. Any of the 0.75 per cent solution left over is poured into the third beaker. A wheal is made over the clavicle. Through this a sufficiently long needle is inserted towards the shoulder, as far as the acromion. During the withdrawal (all such injections are given during withdrawal) a line of 0.5 per cent solution is deposited at the rate of not less than 1.5 mils per centimetre, or more in obese women. In the obese the line should run deep in the fat, because the nerves are in the deepest part. The needle is now introduced in the reverse direction, and a continuation of the line is run to a point on the head of the clavicle of the other side. When this is done, the needle is inserted through the end of the anesthetized strip near the head of the clavicle, and passed down at a right angle to its former direction. A line of injection is run downwards parallel to the sternum, and about a finger's breadth from it. When it reaches the costal margin the direction is again changed, the line being run across the epigastrium and thence along the course of the eighth rib of the affected side. It continues along the rib as far

as a point well over the edge of the latissimus, and there stops. This long encircling line blocks the descending cervical nerves as it crosses their path over the clavicle. Along the eighth rib it blocks overlapping supplies from the eighth and ninth intercostals. In its intervening part, parasternally and across the epigastrium, it produces analgesia sufficient for any ordinary amount of undercutting. As a further effect, we can expect the encircling injection to diminish in some degree haemorrhage through blood supplied from across the border. . . .

"This completes the analgesic injections. Now follows a series planned to restrain haemorrhage. These are (1) internal mammary, (2) pectoral, (3) thoraco-dorsal, and (4) lateral intercostal. They utilize the 'physiological tourniquet' effect of adrenaline, and could be carried out just as well with simple 1 in 200,000 adrenaline solution, though personally I have always used the familiar solution of 0.5 per cent. ethocaine in 1 in 200,000 adrenaline solution. Since the injections are made in an already anesthetized field, preliminary skin wheals are not necessary. . . . During the operation the patient lies usually in a state of quiet euphoria. Sometimes she is very sleepy or asleep. Occasionally, she is garrulous, querulous, or maudlin. Restlessness is extremely uncommon, and if it occurs it is not seriously troublesome. Now and then there are some flushing and quickening of the pulse, apparently due to the hyoscine." 1 reference.

J. C. M. C.

MERRICK: *Degeneration and Recovery of Autonomic Neurons Following Alcoholic Blocks*. Ann. Surg. 113: 298, 1941.

Alcohol injected into the immediate vicinity, or better directly into an autonomic ganglion, resulted in complete destruction of this unit. This was the