

On local anaesthesia by ether spray, as a means for the entire extinction of pain in operations on the inferior animals / by Benjamin W. Richardson.

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ON
LOCAL ANÆSTHESIA

BY
ETHER SPRAY,

AS A MEANS FOR THE
ENTIRE EXTINCTION OF PAIN IN OPERATIONS
ON THE INFERIOR ANIMALS.

BY
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SENIOR PHYSICIAN TO THE ROYAL INFIRMARY FOR
DISEASES OF THE CHEST.

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The following short paper was read before the committee of the Royal Society for the Prevention of Cruelty to Animals, on Tuesday, March 12th, 1867, and is published by the request of the Society.

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LOCAL ANÆSTHESIA

BY

ETHER SPRAY.

IT is one of the great and noble privileges of the science and art of healing, that no new and useful improvement made by the physician or surgeon, is confined in its application strictly to man alone. As a rule, to which there are few exceptions, the improvement may be made to extend to the lower classes of creation, and especially to those inferior earth-mates which are domesticated with us, which share in our labours, suffer with us in physical frailties, and in some instances partake even of our joys and of our sorrows.

This privilege of improving the art and science of medicine, and of distributing the improvement to the inferior creation, has been in a peculiar manner allotted to me, in the simple advance I have been permitted to offer to the world by the invention of a ready process for producing local abolition of pain: the process of benumbing with ether and other volatile fluids applied in the form of spray.

The great discovery of general Anæsthesia first projected by our immortal countryman, Sir Humphrey Davy; afterwards re-discovered by one of our own race, though a native of America, Mr. Horace Wells; and next so powerfully advanced by Sir James Y. Simpson, opened the way to the performance of painless operations on man, and on the inferior animals; and despite the many fatal accidents attendant upon general anæsthesia, it has undoubtedly been a boon, perhaps unequalled, to the human family. To the lower animals however, it has proved of less immediate service in actual practice; partly, because of the trouble of administration, and partly because of the expense and risk which each administration to large animals, such as the horse, puts the operator.

The process I am about to bring before you, removes these practical objections. In respect to the human subject, there are certain occasions and certain operations which seem to call for general anæsthesia. Some men and women refuse an

operation even when painless, unless the mind is also shut out from the procedure: there are one or two great operations such as amputation of the thigh, or at the hip joint where the general anæsthesia may on the whole be yet preferable, apart from moral or physical considerations.* But in relation to the inferior animals neither of these objections prevail; no physical difficulty has to be overcome, and no such operation as an amputation of a limb has to be performed. In so far therefore as the application of the local process is concerned, the veterinary surgeon has in it everything he could desire; and when the three facts are added that the local process is absolutely safe in respect to life, that the time required for perfecting it is a few seconds, and that the expense for all the ordinary operations need not exceed sixpence, I think I may say that in veterinary surgery, the painless art is complete.

THE PROCESS AND APPARATUS.

The process of local anæsthesia which I bring before you may have its advantages all summed up in two words, "practical simplicity." I claim for it only on my part, that it makes local anæsthesia ready at all times and seasons, rapid safe, and convenient.

Previous to my researches, the fact that local insensibility could be produced, was well established, the best agency for the purpose being extreme cold. The phenomenon I am about to show, is anæsthesia from sudden and intense cold.

[The use of extreme cold as a means of removing pain is old, both in principle and practice. Dr. Benjamin Franklin suggested the application of fluids which would quickly evaporate, and so produce cold, for removing the pain of burns and inflammations. Dr. Sutton in 1812 practised with cold for the cure of inflammation, and Dr. N. Chapman, an American physician suggested in 1821 the removal of cancer by frozen metallic plates. But it was reserved for one of the most original and advanced thinkers in this or any previous age of medicine, Dr. James Arnott, in the year 1848, to point out and to prove how extreme cold could render portions of the body so benumbed, that severe surgical operations might be performed under the influence of cold, without pain and without danger.]

* In naming these exceptional operations for the employment of chloroform, I do not mean to convey the idea that they could not be performed under the local method. It would be very easy to produce locally all the insensibility required; but owing to the hemorrhage attendant on the operations, great rapidity on the part of the surgeon is demanded: this rapidity would be somewhat interfered with by the local process.

The apparatus for the ether spray consists first of a bottle for holding the ether. Through a perforated cork a double tube is inserted, one extremity of the inner part of which goes to the bottom of the bottle. Above the cork a little tube, connected with a small hand bellows, pierces the outer part of the double tube, and communicates by means of the outer part, through a small aperture, with the interior of the bottle. The inner tube for delivering the fluid runs upwards nearly to the extremity of the outer tube. When the bellows are worked, a double current of air is produced, one current descending and pressing upon the ether to force it along the inner tube, and the other ascending through the outer tube and playing upon the column of ether as it escapes through a fine jet into the air.

The fluid is thus dispersed from the fine jet into the air, as you see, in the form of spray; it is still in that condition which we call fluid, but it is so finely distributed or sprayed out that it looks like the vapour of water—steam—issuing from the tube. In this finely divided state it easily volatilizes on coming in contact with a surface, the temperature of which is higher than its own; it is thus transformed into the form or condition of matter called vapour, the transformation depending upon the heat it has extracted from the part upon which it has been directed.

I will now proceed to demonstrate this process in practice, selecting myself as the first subject for experiment.

[Dr. Richardson proceeded now to render large portions of his own arm insensible to pain, and to pass darning needles through the insensible structures. The insensibility was next produced on the arms of Dr. Fraser, Dr. Sedgwick, Mr. Gurney, and Mr. Mocatta.]

VETERINARY APPLICATIONS.

In my own earlier inquiries I tested very carefully the effects of the spray anæsthetic process on many of the smaller inferior animals, such as dogs, rabbits, and pigeons, and always with success. It is fair, however, for me to remark that these attempts were not made on the inferior animals primarily. The true experimental part was conducted exclusively on my own body. Afterwards various operations were performed on different individuals, and then the inquiries I speak of were made on the lower forms of living beings.

The results of my labours in reducing the pain of operations on human kind so absorbed my attention, and the work required in setting forth the principles and practice of the process so absorbed my time, that I was delayed for many weeks in proclaiming the extension of the process for operations on animals. At last, when on the point of writing to the *Veterinary Journal*, asking for a trial in operations upon the horse, I was waited upon by my friend, Mr. F. Mavor (of the eminent firm of Mavor Brothers, in Park-street), the object of his visit being to ask me to instruct him in the carrying out of the method in his veterinary practice. Mr. Mavor was soon instructed in all the details, and in a few weeks established the fact of the universal applicability of local anæsthesia by ether spray in the veterinary art.

PAINLESS OPERATIONS.

FOR NERVING.

Perhaps the most painful surgical operation that can be performed on any animal is that of dividing a large nerve. To effect the operation on a horse without the aid of an anæsthetic, the animal has not only to be securely tied down, but the twitch has usually to be put on the nose so as to overcome the pain and the resistance of the subject by a process probably in itself more excruciating and more exhausting than the operation itself. Now, no more is required than to fix the animal without any pain, so that the limb may be kept steady. The surface to be divided is next cleared of hair with the comb and scissors, and the spray is then directed upon the part. The period of complete insensibility of the part is marked in the horse by a hardening of the tissues and a peculiar blue colour of skin. The operator proceeds to divide the skin in the line of the nerve, and as there is no bleeding, the nerve is readily exposed. The nerve being laid bare, the spray is directed upon it until it becomes hard and almost like metal: then a spatula is passed under the nerve fairly to isolate it, a little more spray is applied, and the nerve is cut through with the knife. When the operation is perfectly effected, the division of the nerve is made without a tremor on the part of the subject. The wound is closed and the operation is completed.

FOR THE SETON.

When a seton has to be inserted, as in the leg of a horse, the hair is removed in the line of skin along which the needle must pass. Then the spray is applied like a brush in the course of the line until the skin is quite insensible. Next, at the point where the skin is transversely cut by the seton-scissors, the anæsthesia is carried a little more deeply and over a wider surface. The clip through the skin is made and the needle is introduced. As the needle is pushed slowly beneath the skin, the ether spray should be applied externally in advance of the point of the needle, so as to keep up the insensibility; but when the needle has traversed the required length, and the point is brought out, the ether may be safely withdrawn: the seton-thread itself will pass quite painlessly if it has been well oiled, and the operation is accomplished.

FOR FIRING.

Both on the human subject and on the horse, the local anæsthesia gives all that can be desired for the operation of firing. To carry out the operation on the horse, the hair over the part to be fired is first carefully removed. Next the ether is directed in full and large spray, in such way as to render insensible a space from three to four inches long, and as wide as may be necessary. Very deep anæsthesia is not required, and indeed is objectionable, as it cools the iron too rapidly, and impedes the course of the operation. The firing iron itself has to be sharp, and not at all heavy, and the strokes made with it must be quick and fine, but decisive. During the time when the iron is being used, the ether must be withdrawn, otherwise the vapour takes fire, and the operator is, for a moment, perplexed.

It is worthy of remark that the local anæsthesia not only prevents the pain of the cautery at the period of burning, but prevents the after pain. This is the fact both in the human subject and in the horse.

I have seen a surface of skin six inches long by three broad, cauterized in the human subject with a glowing iron without the least trace of pain; and I have seen a horse in which Mr. F. Mavor, in the same painless manner has made at least forty lines with the cautery, each line being from three to four inches long.

FOR REMOVAL OF TUMOURS.

For the removal of tumours from any of the inferior animals, if the tumour is within reach of the knife or scissors, the local anæsthesia is quite perfect. The hair over the part must be carefully shaven off, and then the whole surface must be made completely insensible. As the knife descends for the dissection of the tumour, the spray must be made to precede the instrument. In a similar manner the frequent operation of castration may be easily and painlessly carried out.

FOR INTERNAL OPERATIONS.

In the human subject, the spray process has been successfully used in the operation for hernia, for the removal of ovarian tumours, and with unprecedented success for the greatest of all operations—Cæsarian Section. In cases of animals such as the horse and the cow, I see no reason whatever why it should not be applied for similar operations. In cases of mechanical obstruction of the bowels, a painless incision large enough to admit the hand into the peritoneum, might readily be performed, and with far more chance of success than befalls the human subject, who though much less resistant to such operations, does nevertheless often recover from them. Again, in cases of parturition, where the function in the natural way is impossible, I see no reason why the delivery should not be promptly and painlessly effected by a lateral section into the womb. I have seen animals lingering for hours in the pains of labour, and dying at last from pain and exhaustion: animals so placed, might, I think, now be relieved at once, and with a very fair chance of recovery, without pain.

FOR APPLYING CAUSTICS, OR ESCHAROTICS.

For applying caustics or escharotics to open and irritable surfaces, the local anæsthesia can in every case be employed. I have thus seen even strong nitric acid applied to an open sore without pain.

FOR RELIEVING GENERAL PAIN.

In addition to the application of ether for preventing the pain of cutting operations, it may be used in cases where there is severe local suffering, as in acute pleurisy, in inflammation of joints, in neuralgia, and in cases of great irritability of joints. In horses suffering from foot lameness, it would be good in the

early stage, to treat by simple rest and frequent local benumbing of the nerve with the spray without dividing the nerve at all. I believe in this way many valuable horses might be rapidly cured of temporary lameness.

APPLICATION TO DIAGNOSIS, OR DETECTION OF DISEASES.

The Messrs. Mavor have used the ether spray with great success as a means in diagnosis, especially in one form of lameness—I mean knee lameness. When a horse is evidently lame in the knee, there may be disease there causing pain; but it is not necessary that the disease should be in the knee, for the disease may be remote, and the knee itself may be sound. It is therefore very important in such cases to determine the precise fact. To test this, the Messrs. Mavor, when in doubt, make the joint very deeply insensible and then have the animal gently trotted. If the animal with the knee joint thus temporarily benumbed trots with perfect freedom, that is to say without lameness, the lameness returning as the sensibility returns, the evidence is conclusive that the disease is in the joint—local irritation. But if when the knee is quite insensible the lameness remains, the evidence is largely, if not conclusively, in favour of the view, that the disease is remote, and that the knee itself is sound.

APPARATUS AND FLUID REQUIRED IN VETERINARY OPERATIONS.

The apparatus required by the veterinary surgeon who wishes to practice local anæsthesia by ether spray, is very simple. The hand bellows already described, the spray tube, and the bottle are all sufficient. At first, I thought that for the horse larger instruments were necessary than are used for the human subject, but in this I was wrong; the same instruments do for animals as for men. A strong tube, capable of taking a single jet and a fish tail jet, suffices for every operation, large or small.

THE FLUID REQUIRED.

The best fluid for the veterinary surgeon, as for the surgeon, is a fluid, to which I have given the name of "Compound Anæsthetic Ether." It is made by distilling together a light hydro-carbon with absolute ether, so as to produce a common fluid boiling at 84 degs. Fahrenheit. For the human subject we have to employ the best ether, as the methylated ether

at present made, causes irritation and redness. But for the lower animals, the methylated ether answers as well as the purer and more expensive variety. I have requested Messrs. Robbins and Company, of 372, Oxford Street, to make a cheaper Compound Ether for veterinary purposes. The quantity of the fluid required for operations on all the inferior animals is less than is demanded for operations on the human body. I could with proper care make one pound weight suffice for twenty operations, large and small as they come naturally before the operator. The cost of the ether is about four shillings and sixpence the pound.

OF THE DEGREES OF SENSIBILITY IN DIFFERENT ANIMALS.

Observations made as to the periods of time, and the degree of anæsthesia required to destroy locally the sensibility of animals, have taught me some curious and interesting facts respecting the degrees of sensibility in some animals. The first fact observed is, that in all animals the sensibility is lower than in men. Amongst common domestic animals, the horse and the dog possess the highest sensibility and after them the guinea pig. The sensibility of the rabbit is low by comparison, and so is that of the cat and the pigeon,

Descending in the scale of the animal creation, the reduction is still more marked; and in the frog the whole sensibility is more easily extinguishable than is that of the finger of a man. In fine, common sensibility altogether rests on the production of thermal force, and on the condensation of such force, in the animal, by the nervous centres which act as storers, multipliers, and feeders of sensation.

My part towards removing the pain of operations from the inferior animals is now done. If the members of communities demand it, I am open to say that every animal so valuable to man, as to be a proper subject for a surgical operation, may be subjected to such operations without any physical suffering, and that also, quickly, safely, conveniently, and cheaply.

In a world still far from civilized, it is not to be hoped that this advance of science will make rapid progress; but in England, at all events, it should make some way, and it will if the Society for the Prevention of Cruelty to Animals, lends its powerful aid.

BY THE SAME AUTHOR.

[IN THE PRESS.]

ON LOCAL ANÆSTHESIA

BY

VOLATILE FLUID SPRAY.

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