

THE INFLUENZA EPIDEMIC OF 1918:

COLOUR OF THE BLOOD IN FATAL CASES.

BY

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ONE of the most striking facts about the world-wide and extraordinarily fatal epidemic of "influenza" in 1918 was that in the bad cases one of the symptoms was a peculiar blue or violet form of cyanosis. At the time this cyanosis was attributed to broncho-pneumonia; but against this explanation was the fact that administration of oxygen failed to abolish or diminish the cyanosis, whereas in the cyanosis which sometimes accompanies ordinary lobar pneumonia, or the lung inflammation of poisoning by irritant gas, the cyanosis can usually be abolished easily by adding some oxygen to the inspired air.

In a paper published in the *British Medical Journal* of August 1st, 1925 (p. 187), on the presence post mortem of nitric-oxide-haemoglobin, by Dr. Banham, Dr. Savage, and myself, a fatal case of broncho-pneumonia (mistaken at first for carbon monoxide poisoning) was described, in which the blood was found to be everywhere red post mortem, and to give certain of the usual tests for CO-haemoglobin, although the patient was cyanosed just before death, and had not been exposed to carbon monoxide at all. The red colour was evidently due to NO-haemoglobin, which appears post mortem in poisoning by nitrite,¹ while the cyanosis during life was due to the fact that in poisoning by nitrite methaemoglobin is formed, producing practically the same colour in the blood as ordinary cyanosis due to reduced haemoglobin.

In this paper we mentioned the fact that Dr. Banham, when in command of the medical section of the military

hospital at Cannock Chase during the war, had repeatedly observed that in the bodies of those who died in the 1918 influenza epidemic the blood was red on exposure post mortem. He had also made a special report on the subject to the War Office.

Since our paper was written I have received information from the doctors and nurses who saw the bodies in fatal cases, both in this country and in France; and they confirm Dr. Banham's experience that the blood was red post mortem, though cyanosis was present during life.

It thus appears to be at least extremely probable that the organism responsible for the very fatal character of the 1918 epidemic was a nitrite-forming organism, and that the main immediate cause of death was anoxaemia due to conversion of oxyhaemoglobin into methaemoglobin. In fatal nitrite poisoning in animals the immediate cause of death is anoxaemia.

Although nitrite-forming organisms are familiar to soil microbiologists, very little, if any, attention has hitherto been given to pathogenic organisms of a similar character. Apart from the 1918 influenza epidemic I have heard of several fatal cases of broncho-pneumonia in which deep cyanosis, probably due to methaemoglobin, was present. It is probable, therefore, that such cases are not very rare, even in the absence of an epidemic of them.

I have written this paper in the hope that some case of this kind may be diagnosed clinically or post mortem, and a proper bacteriological investigation made. It is easy to detect methaemoglobin clinically in a drop of blood, and equally easy to recognize nitric-oxide-haemoglobin post mortem. It seems, however, that unless there is any suspicion of carbon monoxide poisoning not much attention is usually paid at post-mortem examinations to the colour of the blood.

REFERENCE.

¹ Haldane, Makgill, and Mavrogordato: *Journ. of Physiol.*, xxi, 1897, p. 160.

TREATMENT OF PRURITUS ANI AND ANAL FISSURE:

THE USE OF ANAESTHETIC SOLUTIONS IN OIL.

BY

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FROM a practical point of view cases of pruritus ani may be divided into two main groups:

1. The group in which some definite local cause is present. This is usually some lesion which causes an abnormal amount of perianal moisture; amongst the commoner of these may be mentioned prolapsing piles, external piles, fissure, fistula, hypertrophied papillae, rectal polypi and tumours, threadworms, proctitis, etc. Treatment of cases in this group, if limited to removing the exciting cause, together with treatment of the perianal region with simple lotions and powders, is usually effective.

2. The second group is that in which patients complain of persistent severe itching, but examination reveals none of the obvious causes enumerated above. The rectum is smooth, and examination, as a rule, is negative, except that some evidence is found to confirm the patient's complaint of irritation. The perianal skin is often somewhat thickened and thrown into rugae radiating from the anus, with a varying amount of excoriation of the skin or fissuring.

It is cases in this second group which are the great problem as regards treatment. It is probable that a chronic neuritis of the sensory nerves in the anal region is present in most cases of long duration, and hitherto the recognized treatment of cases which have failed to respond to local treatment of the dermatitis has been either (1) operation—Ball's operation or any of the various modifications designed towards sectioning the cutaneous nerves of the anus; (2) the subcutaneous injection of various solutions such as absolute alcohol, quinine-urea, hydrochloric acid, etc.; (3) x-radiation.

After working for the last eight years in the out-patient department of St. Mark's Hospital, I have been impressed with the unsatisfactory results generally obtained by these methods. Judging from the number of patients who attend who have previously had one or more courses of x-ray treatment, the conclusion is forced upon one that the relief obtained, if any, is often of short duration, and the necessity for repeated courses of x rays is dangerous. X-ray dermatitis and x-ray carcinoma of the anus are well-known catastrophes. As regards Ball's operation, it is true that, if properly done, patchy anaesthesia results at once in the flaps outlined by the operation, but it seldom lasts more than a few months; the extensive wound never heals by primary union, and although there may be relief for a time, the irritation often returns after a few months. There is then quite often the added trouble that an atrophic condition of the skin flaps is liable to develop; the perianal skin within the two curved incisions appears thin, shiny, and discoloured, often with patchy excoriation; this may be partly a trophic condition from section of the sensory nerves, and partly due to the impaired vascular supply; it is, I think, a serious objection to Ball's operation.

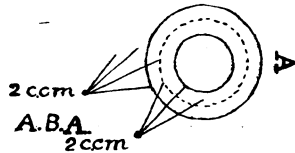
Pruritus being essentially a local condition, it is reasonable to expect a local treatment to relieve it, and subcutaneous injection of an anaesthetic solution appeals to me as being a sensible method likely to succeed. I was therefore greatly attracted by the report of Drs. Yeomans, Gorsch, and Mathesheimer¹ on the use of benacol in the treatment of pruritus ani. This solution was introduced to me last autumn by Dr. Frankfeldt of New York, who very kindly provided me with a supply for trial at St. Mark's. To quote Dr. Yeomans: "Benacol is a solution of equal parts of para-amino-benzoyl-benzoate and phenmethylol in 90 parts of rectified sweet almond oil. It is non-toxic, highly anaesthetic, moderately antiseptic, and, as far as investigated, has a mild depressant action on peripheral nerve endings."

The use of an oily as opposed to an aqueous solution would appear to be particularly valuable as a method of delaying absorption of the local anaesthetic, and therefore

of extending the duration of its action. As an alternative solution to benacol, I have tried and found equally satisfactory a solution known as "A.B.A.," prepared for me by Messrs. Allen and Hanburys, which is now available. A.B.A. is a 3 per cent. solution of anaesthesin with benzyl alcohol 5 per cent. and ether 10 per cent. in sterilized olive oil.

Method of Injection.

The contents of an ampoule of benacol or A.B.A., previously warmed by immersion in hot water, in order to render it more fluid, are drawn into a 2 c.cm. Record syringe. A fine hypodermic needle is attached, and the



Method of charting injection of left posterior quadrant.

solution is injected subcutaneously in a fan-shaped manner around and up to the anal margin. The first injection is usually made under the area of maximum irritation. Two ampoules (4 c.cm.) can safely be injected at a time. The injections are usually repeated at intervals of three to seven days until the entire perianal region has been injected, when areas of continued irritation can then be reinjected. I make a practice of charting the injections in a diagrammatic manner (see diagram), which renders it easy to see at a glance the regions that have been injected.

Results.

A slight burning pain has been complained of by some patients either during the injection or some hours later. There has been no general reaction and no complication (particularly inflammation or sloughing of skin) has occurred. No medicinal treatment (bromides, etc.) has been given to any of these patients, and only the simplest applications have been made to the local dermatitis. Sixteen cases have been treated since September, 1928—7 females, 9 males. The irritation in 10 may be classified as severe, in 6 as moderate. The number of sessions has varied from one to six, and the greatest amount of benacol or A.B.A. that any one case has yet received is 22 c.cm., the average being 8 c.cm. It is too soon as yet to speak of "cure," but all of these patients have been relieved, and 8 have been so much improved that they are now practically free from all symptoms. In at least 4 cases with severe dermatitis the visible improvement in the perianal skin has been most dramatic.

The three following cases may be described as examples of the favourable results that have been obtained.

Case 1.—An unmarried woman, aged 28, had suffered from severe pruritus ani, for which Ball's operation was done in February, 1928. Irritation and pain returned as badly as ever within a few months. When seen in September, 1928, she presented a severely excoriated condition around the anus, with numerous fissures. One ampoule of benacol was injected at weekly intervals for four weeks, with immediate improvement; the slightly indurated skin and bright red hyperaemia round the anus was replaced by smooth, pale skin, the fissures healed, and the patient expressed herself as delighted with the improvement. A fifth and last injection was given in November, 1928; she was seen at intervals, and was finally discharged free from symptoms in March, 1929.

Case 2.—A married woman, aged 45, with severe pruritus ani of ten years' duration. She was treated for eighteen months as an out-patient at St. Mark's, with lotions and powders, with no ultimate relief. On September 18th, 1928, benacol 4 c.cm. was injected through four punctures, and on September 25th 2 c.cm. of benacol was injected. Immediate improvement resulted, and continued until March of this year, when a slight return of symptoms made a further injection advisable. I therefore injected 6 c.cm. of A.B.A. posteriorly to the anus, this being the site of slight irritation, and the trouble is again quiescent.

Case 3.—A man, aged 30, with pruritus of four years' duration, treated previously by two courses of x rays and much local treatment, with no real relief. In January of this year 6 c.cm. of A.B.A. was injected at two sessions, and great relief has been obtained. He now has very little trouble.

ANAL FISSURE.

Spasm of the external sphincter ani is undoubtedly the cause of the chronicity of anal fissures, and hitherto the various methods of treatment advocated have in reality

been directed—and rightly so—towards relieving sphincteric spasm. These methods may be classified into: (a) those which promote relief of pain and consequently the spasm; (b) those which attack the spasm first.

Under the first heading are the following favourite methods: (1) insertion of analgesic ointments such as those containing cocaine, anaesthesin, chloroform, opium, and belladonna; (2) local application to the surface of the fissure of an albumin-coagulating agent such as silver nitrate, mercury perchloride, nitric acid, or ichthyol; (3) injection under the base of the fissure of an anaesthetic solution such as quinine-urea. The second method of treatment includes the old operation of forcible stretching of the sphincter muscle under local or general anaesthesia, and the various degrees of "incision" ranging from partial to complete division of the sphincter.

All of these methods have been useful, but the chief drawback has been their unreliability. The palliative methods have often failed to relieve the sphincteric spasm, and I have several times seen a recent fissure—in spite of treatment—gradually become chronic and undermined, until finally operation has had to be undertaken. The operation of division of the sphincter is often successful, but, on the other hand, I have known cases where the fissure has failed to heal, with return of sphincteric spasm within a few days after the operation. The operation of incision of a fissure is a very excellent one when applied to the chronic undermined fissure, and is usually the only certain method of getting these cases to heal, but no one will deny that the after-treatment is a painful one; the wound takes three to five weeks to heal, and it is a severe operation to undertake for a recent fissure.

In the last eight months I have been using benacol and A.B.A. for the treatment of anal fissures, and as an ambulatory method this promises to cure rapidly a very large percentage of cases. It is, in effect, a combination of the two methods outlined above, and consists in the injection of these solutions into the external sphincter muscle and under the base of the fissure.

METHOD.

For treatment of the usual dorsal fissure the patient lies on his right side and the anus is painted with tincture of iodine. A 2 c.cm. Record syringe is filled with A.B.A., and with a hypodermic needle the skin is punctured one inch behind the anus in the middle line. The left forefinger is passed into the rectum as a guide and the needle is thrust deeply into the sphincter, first on one side of the middle line and then on the other, about three-fourths of a cubic centimetre of A.B.A. being injected into each side. The needle is then partially withdrawn and is directed forwards in the middle line under the base of the fissure where the remainder of the solution is slowly injected. This completes the first treatment, but if desired an application of pure ichthyol to the surface of the fissure may be made. In one case in this series I injected an anterior fissure in a similar manner with success.

A varying amount of pain is complained of during the actual injection, but it is seldom severe. Some cases have had pain three or four hours after the injection, but only in a few very nervous subjects has this late pain been at all marked. In every case of fissure injected great relief has been noted, or even complete absence of pain within the first twenty-four or forty-eight hours after the injection.

When re-examined, between the third and seventh days after injection, the local result is invariably very striking. Sphincteric spasm has usually completely disappeared; the finger is admitted readily without pain and the margins of the anus can be separated in a normal manner. In a number of cases at this stage a sentinel pile, if present, has been excised with scissors without further anaesthesia and without more than a faint sensation being noticed by the patient. Pure ichthyol is applied at this stage to the surface of the healing fissure, and the usual course of events now is for the fissure to be found completely healed about two or three weeks after the first injection, with the patient quite free from any symptoms. I do not consider the presence of a small sentinel pile at the outer end

of the fissure to be a contraindication to the use of this method. The sentinel "pile" is usually a small oedematous tag which on several occasions I have observed to disappear when sphincteric relaxation has been obtained by injection of A.B.A. In other cases the tag has subsequently been excised, either without further anaesthesia or after injection of a few drops of novocain. I believe this method will sometimes prove of value even in the case of an undermined fissure; if the sphincter has been made to relax I see no reason why an undermined tag should not be removed locally and successful healing obtained. In a few cases I have given a second injection of A.B.A., but as a rule the relaxation lasts sufficiently long for the fissure to heal, and the spasm then does not return. In one case, described below, injection of A.B.A. was of particular value in that it allowed adequate examination of the rectum (at first impossible on account of pain) to be performed a week later, when a large fibrous polyp in relation to the upper end of the fissure was discovered and accordingly removed. In no case has there been any history of incontinence from lack of sphincteric tone.

The following cases may be taken as representative of the series.

Case 1.—A married woman, aged 30, with a very painful dorsal fissure of eight weeks' duration. She was given an injection of 2 c.cm. of A.B.A. One week later the sphincteric spasm had disappeared and the fissure had healed. She was discharged fourteen days after the injection.

Case 2.—A married woman, aged 33, had a dorsal fissure with sentinel tag; duration two weeks; the sphincter was very spastic. On February 19th 2 c.cm. of A.B.A. was injected. On February 26th the sphincter was quite lax, and the patient was discharged on March 12th, the fissure being healed, and the sentinel tag had almost disappeared.

Case 3.—A married woman, aged 29, had a dorsal fissure with spastic sphincter and sentinel tag; duration two years. On January 8th 2 c.cm. of A.B.A. was injected. On January 15th her condition was much improved; the sentinel tag was excised without further anaesthesia. On February 5th no symptoms were present, but a superficial crack was still present; 2 c.cm. of A.B.A. was injected as before. On February 12th the fissure had healed; there was no pain or spasm. She was discharged completely healed on February 26th.

Case 4.—A married woman, aged 42. This patient had a chronic dorsal fissure with large sentinel tag and much sphincteric spasm. On March 12th 2 c.cm. of A.B.A. was injected. On March 15th the pain was much less; the sphincter was quite lax, and with a finger a large fibrous polyp in relation to the upper end of the fissure was discovered and readily delivered outside the anus. Novocain was injected at its base, and the polyp excised together with the sentinel tag. On March 26th the anus admitted two fingers readily, and the patient was discharged healed and free from symptoms on April 19th.

To summarize the results: 30 cases from my out-patients' clinic at St. Mark's Hospital and from my private practice have been injected; 18 have been discharged healed, mostly within a period of ten days to three weeks after the injection of A.B.A.; 6 cases remain under treatment. Two cases with indurated fissures were injected with A.B.A., but on further consideration I decided that operation would be more suitable and certain. Finally, 4 cases of recent fissures were injected once, but have not reported for re-examination. So far as I am aware, no patient has had to lie up or discontinue work while under treatment.

CONCLUSIONS.

As an ambulatory treatment for pruritus ani and the subcutaneous injection of anaesthetic solutions in oil, such as benacol and A.B.A., would appear to be safe, of considerable value, and worthy of extended trial.

In the treatment of recent anal fissures the method described can be promised to effect a rapid and brilliant cure, and this early stage is obviously the best for treatment to be undertaken. In fissures of some duration, relief of pain and healing are likely to be obtained in a considerable proportion of cases.

REFERENCE.

¹ F. C. Yeomans, R. V. Gorsch, J. L. Mathesheimer: *Trans. Amer. Proc. Soc.*, 1927.

TREATMENT OF PELVIC INFLAMMATIONS BY DIATHERMY.*

BY

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THE method of treating pelvic inflammations by a diathermy current passed between electrodes placed back and front may or may not be good, but it is not treatment by heating the pelvic contents. If, during a treatment so administered, a thermometer is placed in the cervical canal, no rise of temperature will be recorded. The method to be described in this paper is one in which the pelvic contents are heated by a high-frequency oscillating current, which is applied by means of an electrode introduced into the cervix or urethra.

The treatment of pelvic inflammations by the diathermy current arose, as will be seen later, out of the method of treating gonococcal infections of the cervix and urethra by this current. Diathermy treatment of cervix and urethra for gonococcal infection was founded upon the known fact that the gonococcus is vulnerable to comparatively slight rises of temperature above the normal temperature of the human body, though whether this is the only factor concerned is open to question. It was known that attempts had been made to free the male urethra from gonococcal infection by means of sounds heated by hot water circulating through them. These attempts failed because the sounds would, of course, not heat the tissues immediately underlying the mucous membrane. These deeper tissues can, however, be heated by a diathermy current to some depth, and it was decided to try the effects of heating them in this way.

Dr. E. P. Cumberbatch, in treating arthritis by diathermy of the joints, had observed that those cases which recovered were always due to gonococcal infection, and that there was no such beneficial effect on other cases of arthritis. As a result, attempts were made to rid the cervix and urethra of gonococcal infection by using the diathermy current, and during 1919 I arrived at the method of heating these tissues by means of metal electrodes introduced into their lumen.

The cervix, being insensitive, can be heated to any required temperature without an anaesthetic, but this, of course, is not so in regard to the urethra. An anaesthetic is undesirable because the patients must be treated as out-patients. The temperature at which the sensation of heat changes to pain is 115° F., and the urethra cannot therefore be heated beyond this without an anaesthetic. Moreover, up to this temperature no inflammatory reaction occurs, and, if it is not exceeded, no pain or discomfort follows the treatment. If it is even slightly exceeded some symptom indicating an inflammatory reaction, such as pain on passing water, will occur on the day following the treatment. No harm results until 131° F. is reached. It seems that the reaction to a temperature up to 115° F. does not set up inflammation, but that an inflammatory reaction begins directly this temperature is passed. As it is necessary in cases of gonococcal infection to treat both urethra and cervix at the same sitting, and inflammation following the treatment is to be avoided, the temperature of 115° F. is taken as the maximum allowable.

It was realized that if this temperature was insufficient the method would fail. There are two factors in the production of the lethal effect on the organism—namely, temperature and time. It was determined empirically that this temperature of 115° F. was sufficient if the length of time during which it was maintained was ten minutes. The number of times the process had to be repeated in the case of gonococcal infection was found to vary considerably, but generally six to eight bi-weekly treatments proved to be sufficient.

The technique now used is as follows: An electrode is introduced into the urethra, and by means of the diathermy current the tissues immediately surrounding the electrode

* Abstract of a communication to the Section of Electro-Therapeutics of the Royal Society of Medicine.