In private houses similar precautions should be taken. The infected person must never tread with bare feet where an unaffected person will step. On leaving his bath he should step on to his own bath mat, which should be removed from the bathroom as soon as he leaves. No one else should use his bath towel, and probably it is safer to swill down the bath with a weak antiseptic after he has used it. The evidence is not conclusive, but it is probable that the infection is more usually contracted in bathrooms than elsewhere. So little is known about the dissemination of the wart virus that it is better to be overcautious rather than risk dissemination of the virus by lack of caution.

In the earliest stages the warts can in most cases be destroyed by the use of a wart paint—for example:

R. Zinci chloridi 3 ss
Collodium acid. salicyl. (1 in 10) ad 3 i
Misce.

A spicule of wood should be dipped into this paint and then bored gently into the wart. The treatment should be carried out twice daily, and if the patient is placid the results are usually satisfactory. Many persons complain bitterly that they cannot stand the pain, and other measures have to be employed.

Most dermatologists prefer to use radium or x rays, and these physico-therapeutic agents are the least painful methods of treatment and the most certain in their results. In my experience, using x rays filtered through 0.5 mm. aluminium, a plantar wart requires an average of 900 r units of x rays before it succumbs. While receiving treatment it is advisable for the patient to wear white cotton socks underneath his usual socks throughout the day. These socks should be boiled every night. The feet may be powdered with an antiseptic dusting powder.

If physico-therapeutic measures are not available excision may be attempted. In my hands local anaesthesia has not been very successful: I have found it to be almost impossible to infiltrate the part with novocain without causing much pain. I prefer to use a general anaesthetic (nitrous oxide or gas-and-oxygen). The warts should be scraped out with a sharp curette. It is surprising how deeply the roots are situated. I have found it best to remove the horny collar which surrounds each wart, as recurrence is frequent if this is left. Bleeding should be controlled and the area disinfected, so far as is possible, by the application of the silver nitrate pencil. Dry dressings are usually adequate, and healing is complete in about fourteen days. Diathermy or refrigeration with carbon dioxide snow are alternative measures. Goldsmith (1936) recommends that the "snow" should be applied for three to five minutes: a large bleb will develop, allowing the wart to be painlessly excised about three days later. Good results have been claimed for treatment by cataphoresis with zinc sulphate.

Chiropodists often treat these cases successfully. They generally aim at destruction of the wart by escharotics or keratolytics. Runting (1935) states that their object is "to destroy the growth so thoroughly that such a reaction may be created in the healthy tissue as to bring about a line of cleavage between the destroyed growth and the normal healthy tissue. The culmination of this process is usually accompanied by effusion of serum or sero-pus. . . . The whole art of the successful destruction of verrucae depends upon inducing this condition effectually without causing more disturbance to the normal tissue than is actually essential to the cure." "The majority of chiropodists bring about the desired result with acids, such as nitric, acetic, monochloracetic,

trichloracetic, salicylic, chromic, pyrogalllic, or acid nitrate of mercury; or with such powerful alkalis as potassium hydroxide or sodium hydroxide."

In the majority of cases the surrounding tissue is protected by an application of vaseline, and the acid or alkali is applied with an orange stick and "worked into the growth." A protective dressing is employed and a few days later the treatment is repeated, the tissue which has been destroyed by the previous treatment being removed before fresh acid or alkali is applied. By proceeding slowly and giving regular treatments the warts are destroyed with a minimum of pain. The use of pyrogalllic acid is effective and is not associated with much pain unless the application is left *in situ* too long. The acid is applied as an ointment (30 to 50 per cent. in ung. resinae) once or twice weekly, the usual occlusive precautions being observed.

Summary

Attention is drawn to an epidemic of plantar warts among school children.

A short description of the signs, symptoms, aetiology, pathology, and treatment of the warts is given.

[The photograph in the Special Plate is reproduced from *Diseases of the Skin* (fourth edition), published by Messrs. Baillière, Tindall and Cox.]

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INTRATHECAL ALCOHOL INJECTION FOR RELIEF OF PAIN: A REVIEW

BY

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Dogliotti in 1931 first suggested the use of subarachnoid injections of absolute alcohol as a simple and comparatively safe means of alleviating severe chronic pain of which the cause is not amenable to treatment. He pointed out that the various surgical measures designed to relieve pain (posterior rhizotomy, chordotomy, sympathectomy) are operations to which many patients suffering from such conditions as advanced malignant disease cannot justifiably be submitted; nor are they always successful. Paravertebral nerve-blocking is an alternative, but it is difficult to carry out and is uncertain in its effects.

Dogliotti's aim in devising this method was to bring about a partial destruction of the appropriate posterior nerve roots close to their entry into the spinal cord. Accepting the assumption that pain is proportional in severity to the numerical strength of the sensory impulses reaching the centres concerned, he argued that this "decimation" of the afferent nerve fibres should reduce the pain-provoking stimulus below threshold value. From animal experiments he satisfied himself that it is possible to limit the action of the alcohol with sufficient precision to the posterior roots; only when the doses used were excessive did symptoms of motor paralysis follow the injections.

Principles of Treatment

The principle underlying the method is that absolute alcohol possesses a specific gravity considerably lower

than that of cerebrospinal fluid. It can be demonstrated *in vitro*, by using alcohol coloured with a dye, that it floats on the surface of cerebrospinal fluid for several minutes with very little admixture. It is therefore possible, by placing the subject in a suitable position, to introduce alcohol into the subarachnoid space in such a way as to cause it to come into contact with the posterior roots it is intended to destroy, but not with other structures which it would be undesirable to injure.

Dogliotti himself in his original paper described forty-five cases of various kinds (all non-malignant) treated in this way with doses ranging from 0.2 to 0.8 c.cm. Of these patients twenty-seven (60 per cent.) were partially relieved, and nine (20 per cent.) were unrelieved, or almost immediately relapsed, or were lost sight of (one case). Since that time much the same degree of success has been achieved in both malignant and non-malignant cases by workers using this method or some modification of it. The literature includes papers by Yeomans (1933), Saltzstein (1934), Stern (1934 and 1936), Sloane (1935), Grant (1935), Silverstein (1935), Rowe (1935), Greenhill and Schmitz (1935 and 1936), King (1935), Babcock (1935), Abbott (1936), Meynier (1936), Russell (1937), and Todd (1937). On injection the relief of pain is often immediate, but is sometimes delayed for a considerable period—according to Dogliotti as long as forty days. In a number of cases the first injection has been unsuccessful, but pain has been completely relieved by a second. Todd (1937) in two cases found it necessary to repeat a successful injection in three months. The length of time for which the effect of treatment is felt has varied in the recorded cases. Dogliotti gave the maximum as six months, and Stern as eight months. In Todd's series the maximum period of relief was sixteen months and the average period five months.

The effects of alcohol injections upon the cord and nerve roots have been studied post mortem in a few instances; they are extremely slight. In Todd's cases they included extreme congestion of the vessels around the nerve roots and throughout the lower part of the cord, thickening and hyalinization of the vessel walls, and some perivascular deposit of hyaline fibrous tissue. Ritchie Russell reported demyelination of nerve fibres and cellular infiltration both in the posterior nerve roots and in the column of Goll in two cases examined twelve months and nineteen months respectively after alcohol injection. Dogliotti found that the cerebrospinal fluid examined a few days after an injection is under increased pressure and shows a slight increase of albumin and of leucocytes. Normal conditions are restored in about ten days.

Technique of Injection

The method used by different workers has varied somewhat, but in most cases either absolute or 95 per cent. alcohol has been given in doses of 0.2 to 1 c.cm. without previous withdrawal of cerebrospinal fluid or barbotage. In one only of the recorded cases was barbotage employed. Meynier (1936) withdraws 10 c.cm. of cerebrospinal fluid and injects an equal quantity of dilute alcohol (5 to 7.5 per cent. solution of absolute alcohol in distilled water), introducing it "rather rapidly." In view of possible dangers it is best to begin with small doses and repeat the injection, using a larger dose, if necessary. The treatment can quite well be given to the patient in bed, though it is easier to arrange and maintain the required position on an operating table furnished with a kidney bridge. A general anaesthetic is very rarely necessary, but local anaesthesia may be used if desired.

Having decided which nerve roots are to be the objective—taking into consideration the innervation of the diseased organ and the situation of the pain—the interspace to be employed for the injection is calculated from the known relation between the spinal segments and the bones of the vertebral column. The risk of injuring structures other than the posterior roots in question is minimized by introducing the alcohol as close as possible to the point of emergence of the latter from the cord. When, therefore, the lumbar or sacral roots are the objective the very general practice of making the injection through a lumbar interspace is open to criticism. Since the spinal cord does not extend, at most, lower than the first lumbar interspace, alcohol introduced below this point will come in contact with the nerves of the chorda equina, where its effects cannot be accurately localized. It is technically easier to introduce a needle through a lumbar than through a dorsal interspace, but it would seem to be much safer to use the space most nearly corresponding to the spinal segments involved.

The patient is placed on the side opposite to that on which the pain is felt; if the pain is bilateral, on the side on which it is less severe, supposing there is any inequality. The spine is well flexed in a forward direction and the head lowered either by raising the foot of the bed or by tilting the operating table. The spine is flexed laterally by means of pillows or sandbags or by elevating the kidney bridge of the operating table, so placed that the site of the proposed injection is raised and the spinal segments corresponding to the nerve roots aimed at become the highest part of the spinal cord. At the same time the body is inclined forward at an angle of 45 degrees. This brings the posterior roots into a horizontal position, where the greatest possible length is exposed to the action of the alcohol, while the motor roots are brought into a plane in which they are less likely to be damaged. The puncture is made in the midline with an ordinary fine lumbar puncture needle. When puncturing a dorsal interspace it must be borne in mind that the needle must be introduced obliquely upwards as well as forwards, in a plane almost parallel with the skin surface of the back. To avoid injury to the cord in this region it is safer to remove the stylet from the needle before it enters the theca. It is dangerous to make a puncture above the dorsal region.

As soon as the needle is well in the subarachnoid space the syringe containing the measured dose of sterile alcohol is attached and the alcohol very slowly injected, at a rate of about 0.4 c.cm. a minute. After the injection is finished the patient is kept in exactly the same position for a time sufficient to allow the alcohol to act upon the posterior roots. The period allowed for this by different workers varies from ten minutes (Stern) to two hours (Greenhill and Schmitz). At the end of that time he is placed flat on his back and left in that position for twenty-four hours. It is wise to keep the foot of the bed raised for the first few hours. If it be necessary to repeat the injection either on the same or on the opposite side an interval of five to seven days should elapse before this is done.

A feeling of burning may accompany the introduction of the alcohol, but this quickly passes off. Pain may stop immediately, or, as already mentioned, its relief may be gradual. Dogliotti observed in many of his patients that immediate cessation was followed by a temporary return of the pain, lasting for some hours or days and succeeded in its turn by gradual relief. There may also be transient numbness and weakness of the leg on the side of the injection, sometimes associated with temporary loss of the tendon reflexes. In some cases more serious

motor disturbance has occurred, such as paraplegia, retention of urine, or loss of control of the sphincters. For the most part these symptoms have passed off after some hours or days; in a few of the cases a greater or less degree of disability has persisted. Silverstein's patient, a tabetic, was left with complete motor and sensory paralysis of the leg, but in this case an unusually large dose of alcohol (9 c.cm.) was given. In Sloane's patient, also a tabetic, there was retention of urine and faeces, abolition of the ankle-jerk and paresis of the muscles of the lower leg on both sides—more pronounced on the side of the injection—and anaesthesia of the back of the thigh and leg and of the peri-anal region, complete on the side of the injection and partial on the opposite side; a certain degree of weakness of the legs and difficulty with micturition was permanent. Babcock also observed persistent weakness of the leg. In one of Todd's cases a meningeal reaction occurred, but this subsided spontaneously in four days. One death has so far been reported—by Abbott, in a patient in the last stages of malignant disease who died the day following the injection. Russell's series of twenty-five cases included one case of retention of urine and three cases of sphincter paralysis; and among Todd's eighteen cases retention of urine and incontinence of faeces occurred in two and incontinence of faeces alone in one. In all these cases, and in others reported in the literature, recovery took place within a few days. The longest time taken for recovery from these sphincter disturbances has so far been two weeks. One case of diarrhoea lasting three weeks has been reported (Greenhill and Schmitz).

The comparative rarity of motor disturbances after subarachnoid injection is probably due in part to the relative insensitivity to alcohol of motor as compared with sensory fibres; it is difficult otherwise to understand why these disturbances do not more often accompany injections given in the region of the cauda equina.

One case may be added to those collected from the literature. This patient, a woman of 57, was suffering from intense pain in the right side of the abdomen associated with generalized melanotic disease of the liver, secondary to a malignant melanoma of the choroid for which the right eye had been removed five years before; the pain was constant and relieved by morphine only to a very slight extent and for an hour or two at a time; she was worn out from lack of sleep. The diagnosis having been confirmed by exploratory laparotomy and biopsy, 10 minims of 95 per cent. alcohol were injected through the seventh dorsal interspace. The injection was wholly unsuccessful. It was therefore repeated a week later, the dose being increased to 20 minims. This time relief was immediate and complete. Neither injection was followed by complications of any kind.

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THE EFFECT OF IRON ADMINISTRATION IN CASES OF SUBNUTRITION

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It is a pity that medical officers in charge of a welfare centre under the control of a local authority do not more often publish their experience at the centres. The number of children attending is usually large and the work done excellent, but the amount of literature relating to these clinics is much too small. One realizes that the difficulties of research work are many, the greatest of them being the lack of co-operation from parents. Numerous plans are conceived and much work started; but the result is *nil*, as parents will not bring their children along for examination often enough, and so results that are promising cannot be put in the tabulated form necessary for publication. This is a great loss to the general practitioner, who often has little chance of obtaining experience in the pathology or even the physiology of infant life during his first few years of practice. The following work was carried out partly at a toddlers' clinic (children from 1 to 5 years old) and partly at the laboratory, both under the control of a local authority (county borough, population 150,000). For reasons already mentioned the figures were not nearly so complete as one would desire, but they are of value as showing a positive result from a simple and cheap form of therapy for a certain defect prevalent among children in the poorer-class districts of many boroughs.

At the clinic under consideration the children attending belonged to families whose chief breadwinner was often unemployed for long periods, and whose food was therefore mostly of the cheap variety. The proteins necessary for adequate growth were seldom present in the daily menu. The children's food consisted in the usual energy-producing carbohydrates, mostly in the form of wheat of different millings made edible by the addition of animal or vegetable fat. During the summer first-class proteins such as eggs, fish, and meat could be bought, but in the winter, when these foods were most necessary, they were often lacking, and malnutrition therefore followed.

Many of the children attending the centre had pale mucosae, and showed lack of energy, anorexia, subnutrition, and dullness of spirit. It was decided to try the effect of the addition of iron to their diet, unaided by anything else that might cause a diminution in the existing subnutrition. The children were chosen and sent to the laboratory, where complete blood examinations (cell count, films, and haemoglobin estimation) were carried out. In order to reduce the passive opposition of the parent this blood examination was made only at the first attendance, subsequent investigation being confined to estimation of the percentage of haemoglobin. In this way we could eliminate those children who were not actually anaemic though appearing so on clinical examination. All the children selected, however, were anaemic both on clinical and on biological grounds.

The parents were not advised regarding diet, but were merely given a bottle of ferri et ammon. cit., to be taken by the children once daily in any form of food. The first