THE APPLICATION OF CONTINUOUS SUCTION IN SURGERY.*

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THE use of continuous suction as a means of removing blood during operation, and of subsequently draining wounds and withdrawing secretions, has recently received some attention. Dr. R. H. Woods, of Dublin, published an interesting paper in the *BRITISH MEDICAL JOURNAL* of May 20th, 1905, On the Treatment of Purulent Cavities; and a second, entitled, On the Saliva Ejector as a Surgical Instrument, in the *Journal of Laryngology*, February 2nd, 1906. In the last mentioned paper he dealt with the subject as applied to nose and throat operations, and I wish now to endorse what he and others have said, and to advocate

a more extended trial of this agent in general surgery. I have systematically employed continuous suction, as opposed to intermittent aspiration, for many years, and there can be no question of the benefits conferred on patients, especially after the operation of cystotomy, both as regard their comfort and their general well-being, for they are kept thereby quite dry, and thus relieved of the infliction of frequent dressings, which are imperative under ordinary circumstances. Dryness and the relief thus afforded undoubtedly enables wounds to heal more rapidly, and tends to a lower mortality from post-operative causes.

The chief obstacle which has up to the present prevented the more general employment of continuous suction is, I think, the want of some portable apparatus which can be used in any place, and which will easily maintain a continuous negative pressure without much attention. Neither Cathcart's pump, nor G. W. Richardson's modification, entirely fulfil these requirements.

My first endeavour to overcome this difficulty was with a modified form of Plunkett's well-known saliva injector, fitted with a Royle's patent tap-union, by which it could be attached to any water supply (Fig. 1). This has proved most successful in many cases. I have used it for more than seven years, and others have tested its capabilities. It works well as a rule, if the water pressure is good, though its action is not very rapid and rather liable to variation. But the great objection to it is that the motive power—that is, the water supply by which it is worked—

is very frequently inconveniently situated with regard to the patient's room, thus rendering a long length of tubing necessary to bring the suction to the place where it is wanted.

With the appliance shown in Fig. 2 that objection is obviated. It consists of a rotary pump, which will mechanically extract air, and a small electric motor to drive it, both being enclosed in a portable box. As almost every house and room has now an electric installation, the motive power exists everywhere, and always close at hand.

Fig. 1.

a shilling a day, reckoning the B. T. electric unit at sixpence.

I may mention one or two other points which have to be provided for in order that suction may be successfully applied in surgery.

1. To prevent the blocking of the suction tube in the wound either by the tissues themselves, or by blood clot, mucus, or pus.
2. To provide for the drainage and removal of fluids collected in cavities, or dependent parts not actually reached by the suction tube itself.

Fig. 2.

Connexion between the motor and the nearest lamp holder has only to be established and the pump is ready to work. This apparatus is exceedingly efficient, extracting 10 to 12 cub. ft. of air an hour, and will produce a high negative pressure (over 29.5 in. of mercury). It will run for days, requiring only to be lubricated occasionally. The weight of the complete apparatus is about 26 lb., and the cost of running it does not exceed

The easiest method of draining is to insert the end of the suction tube into one of considerably larger diameter placed in the wound in the ordinary way. The latter acts as a caisson, or well, to collect the fluid, and from which the fluid is sucked as soon as it reaches the level of the aspirating tube. This plan has a disadvantage, for although it prevents overflow and succeeds in keeping the cystotomy patient perfectly dry, yet it does not

drain the cavity, and always allows a pool of fluid to remain below the level of the suction tube. If, however, the caisson is replaced by a porous or absorbent one, which I effect by tightly wrapping several layers of lint or gauze round the lower 3 in. of the suction tube, the result is much better. The fluid is first soaked up into the material, and is then gradually extracted from it and carried away by aspiration. The roll of material must of course extend beyond the lower end of the tube, and be long enough to touch the floor of the cavity and at the same time project above the surface of the skin; for otherwise atmospheric pressure will be unable to act on the cavity, and a negative pressure

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will be established there, when extraction of fluid will at once cease.

Another application of this principle is simply to embed the end of the aspirating tube deeply among the dressings. By either means extraction continues as long as any part of the absorbent dressing touches fluid; so that secretions, etc., percolating into a cavity, are at once absorbed by the material and then extracted and carried away to the receiver by the suction action. The receiver of which I have just spoken is a large bottle interposed between the pump and the suction tube. It catches and retains all the fluids withdrawn, and prevents the blocking of the apparatus.

This pump may also be used to irrigate a wound with any solution desired. One end of a small tube is attached to the outlet of the pump, the other to the short arm of a Woolf's bottle filled with the irrigating solution. A second tube—that which is to convey the fluid to the wound—is connected with the arm extending to the bottom of the bottle. The action, then, of the pump is to force air into the bottle and create a positive pressure, which in its turn drives the solution along the irrigating tube to the dressings in the wound. If a small and continuous supply of solution is wanted, the irrigating nozzle must be quite fine and the pressure regulated by adjusting the escape valve connected with the Woolf's bottle. Thus, a wound may be drained and irrigated at the same time without discomfort to the patient.

Suction has been employed in draining the chest, the kidneys, the gall bladder, the throat and nose, and I think with this more convenient and powerful apparatus a further trial should be given, not only in these cases, but also in all where it is important to remove secretions and discharges.

With regard to the removal of large quantities of water—for instance, when a cavity is being flushed during an operation—the calibre of the suction tube must be considerably increased and provided with a tap which can be turned off, so that the receiver can be partially exhausted before being used. In this way very large quantities of blood and fluid can be rapidly withdrawn in a short space of time.

Messrs. Maw and Sons, Messrs. Allen and Hanbury, and other instrument makers will lend the apparatus to any one who may care to give it a trial.

A FATAL CASE OF LEAD POISONING DUE TO DIACHYLON.

By F. STRONG HEANEY, M.D.DUB., F.R.C.S.IREL.

THE series of cases of diachylon poisoning reported by Dr. Edmund Hay in the *BRITISH MEDICAL JOURNAL* for January 23rd, and the fatal case reported by Dr. Arthur T. Hall the following week, induce me to place on record a further case which proved fatal twenty-one days after taking diachylon. The case, which was under my care during the seven days preceding death, has not previously been reported. It is interesting as well for the train of symptoms presented and the *post-mortem* appearances as for its bearing on the efforts now being made to stop a widespread evil.

On January 21st, 1908, I was summoned to attend a married woman, aged 25, who was said to have suffered from gastritis for a long time, but to have become worse during the last fortnight. On entering the room I noticed an unusual sweetish sickly odour not to be described in words—a smell *sui generis*; and, on examining the mouth to find a possible cause in carious teeth, I observed a well-marked blue line on the gum margins. The patient was six weeks pregnant, and on being questioned admitted having taken diachylon a fortnight previously. I subsequently elicited the following history:

History.

She was the mother of two children, the younger being about 2 years old. Though in fairly comfortable circumstances, she had always been delicate and anaemic, and had a haunting dread of any further increase in family.

On January 8th, realizing that she was again pregnant, she bought, at the instigation of a friend, a quarter of an ounce of diachylon in mass. She rolled it into nine pills, which she took at short intervals in the course of forty-eight hours. Within a few hours of taking the last of the pills she began to have severe abdominal pains. Hot applications and hot drinks gave no relief, and after a day she began to vomit. Intermittent

pain and vomiting continued for four days, then the vomiting ceased, but pain continued as before. During this time the bowels remained constipated. They were slightly relieved by enemata; no magnesium sulphate nor other purgative was given, the patient's stomach being considered "too weak" to stand purgation. On the other hand, morphine was administered to relieve the pains.

About a week after taking the diachylon mental symptoms first appeared. She became sleepless, and at intervals imagined she heard bells ringing, saw herself sitting in snow-drifts, imagined she was falling out of bed, etc. She had occasional attacks of faintness, especially on trying to sit up or turn suddenly in bed.

Condition when First Seen.

I first saw her a fortnight after she had taken the diachylon. She was then very anaemic and emaciated. She lay on her back prostrate, slipping down from the pillows. The skin felt cold (temperature 97°) but not unduly dry or moist. The tongue was dry and furred, and the lips covered with sordes. With the breath was exhaled the peculiar odour referred to above. The pulse was 138, soft and full. The bowels had not moved once since taking the diachylon save as the result of an enema. In spite of this, however, and in spite of a dilated stomach subsequently discovered the abdomen was retracted and flaccid. Urine was being passed frequently in small quantities, and accompanied by pain and burning. Seven ounces, saved the day after my first seeing her, yielded on analysis the equivalent of $\frac{1}{10}$ gr. of metallic lead. The specimen was otherwise normal.

Treatment and Subsequent Progress.

Magnesium sulphate was administered, and seemed at first to relieve two pressing symptoms—the constipation and the delusions. Digitalis and strychnine were given to combat the attacks of faintness. Under their influence the pulse-rate fell from 138 to 120 but gradually rose again to 140. Potassium iodide seemed to be contraindicated having regard to the large quantity of lead already in circulation and being excreted.

On January 26th, seventeen days after taking the diachylon, she complained of severe pain in the left shoulder and upper arm. Next day the pains had disappeared, leaving the muscles of the limb almost completely paralysed. Feeble flexion and extension at the phalangeal joints were the only movements left. Sensation was diminished but not completely lost. On January 28th the same condition appeared in the right arm, and passed through the same phases—first pain, then palsy and partial anaesthesia.

On January 30th the pulse became very rapid and irregular, and on the 31st she died in one of her attacks of faintness. This last phase of "heart delirium" was evidently brought about by implication of the vagi, but up to the end there was no indication of interference with the innervation of respiration.

Necropsy.

The chief features of the *post-mortem* examination, made by Dr. Raw at the coroner's request, were (1) acute inflammation of the mucous lining of the stomach and intestine, extending in some places to actual ulceration, (2) acute fatty changes in liver and heart.

From the evidence at the inquest it would appear that the practice of taking diachylon to produce abortion is prevalent in both Lancashire and Cheshire. It was stated, moreover, that nowadays when a diachylon plaster is required as such it is almost always called for "ready-made"—that is, spread on calico, etc.; in other words, whenever diachylon is demanded in mass the inference is that it is required for an illegal purpose. Even apart from the ethical aspect of the matter, it is regrettable that the class of people who resort to the drug are unaware of its poisonous effects.

Memoranda:

MEDICAL, SURGICAL, OBSTETRICAL.

ALCOHOL AS A SURGICAL DRESSING.

For some years it has been the custom in many surgical clinics to use methylated spirit as an agent for cleansing the skin previous to operation, and also for removing the inspissated debris from around the wound at the subsequent dressing. An antiseptic wash of some kind is usually applied to the wound itself. For some time now I have gradually found myself abandoning the use of any antiseptic wash at the dressings, and confining myself entirely to spirit, whatever the nature of the wound. It may temporarily smart, but it is only for the moment. But what I wish to state more especially is that spirit forms a most excellent dressing for wounds. For months I have used it alone in all freshly-incised wounds for whatever purpose—in many cases of radical cure for