VIII. *Fracture of Right Leg at the junction of Middle and Lower Thirds: Severe Transverse Wound two inches above the Ankle down and into the Tibia.*—W. M., aged 54, was admitted September 8th, 1871. He was thrown down this morning at 8 o'clock, when at work with a reaping-machine. The right leg was seriously injured. When he was seen at 2 P.M., there was found to be a simple fracture of the tibia at the junction of the middle and lower thirds. There was a wound about two inches above the ankle-joint, gaping widely; all the tendons, etc., were divided down to the bone, and the knife of the reaper had made a groove into the tibia itself. He had lost a good deal of blood. The limb was much swollen. The two points of injury, doubtless, communicated. There was hardly an inch and a half of clear skin space between them, and pressure above the fracture made blood well up from the wound below. The leg was put up in a swing splint; the skin was washed, and the wound mopped out with carbolio lotion (one to twenty), and a tent of carbolised oiled lint was introduced to the deepest part of the wound. The tent was removed in twenty-four hours. There was large oozing of blood-stained serum on the dressings throughout the first eight or ten days. The man had had no constitutional disturbance. He had eaten meat since the day after admission. He needed no sedative, and had very little pain. On October 4th, from some want of care in the dressing, and the consequent admission of air, a few drops of pus were noticed for the first time, and small suppuration (never more than half a drachm in two days) afterwards continued. On October 23rd, the wound was all but well; the fracture was sound. He was ordered to have a starched bandage applied.

IX. *Incision into Knee-Joint.*—G. B., aged 23, was admitted August 11th, 1871. He had disease of the right knee-joint of fifteen months' standing. Since an accidental slip the symptoms had been much aggravated. The joint was much swollen, and he could not bear the slightest movement; there was also much pain on pressure. The limb had been confined at home by a long splint, and a weight, working over a pulley, attached to the foot; but these measures had given very small relief. Destruction of cartilage was, no doubt, going on. On August 11th, chloroform being given, I made a free incision on the inner side and parallel to the right patella, letting out at once about a tablespoonful of sero-purulent fluid. Antiseptic dressing was applied. The interrupted splint and pulley was reapplied. The relief was immediate; the man was at once able to eat and sleep. No constitutional disturbance followed. The joint soon became smaller. The blood-clot, which ultimately became organised, filled up the incision, and through the intestines of this clot for ten days or more pus slowly oozed. On September 12th, the wound, which had not been dressed for the past eight days, was now quite well. On October 5th, a starched bandage and paste-board support was ordered to be applied to the limb. The patient was allowed to move about on crutches. On the 20th, he could bear some little weight on the limb, and was in very fair health.

XI. *Incision into Knee-Joint.*—R. F., aged 17, was admitted September 19th, 1871. She had had for some long time weakness in the left knee. Pain and swelling about the joint came on six weeks before admission, since which time she had kept her bed. On admission, the left knee was much swollen; fluctuation was perceptible; she shrieked on the slightest movement. She had lost flesh; had no appetite; and could only sleep with large doses of opium. On September 23rd, Mr. Eddowes made an incision on the inner side of the patella, letting out sero-purulent fluid mixed with blood. The patient was under chloroform. Considerable relief followed. In two or three days the appetite was much improved. There was no constitutional disturbance; no redness around the wound; no pus from the wound. On October 3rd, the joint was much diminished in size.

XII. *Ovariectomy.*—S. A., aged 32, the subject of marked ovarian disease, was tapped in July 1871, when thirteen pints of fluid were removed—a solid mass remaining in the left iliac fossa. On September 21st, ovariectomy was performed. Carbolio acid spray was employed, and antiseptic dressing. The pedicle, which was thin, was tied in two halves with catgut, and returned. On the 30th, it was necessary to break up the adhesion of the lower part of the wound to relieve the distension from contained fluid. There was a large effusion of blood into the lower third of the abdominal cavity. No putrefaction, however, occurred, and no pus formation until a month after the operation; then it was superficial, from accidental displacement of the dressings. The woman is steadily recovering.

REMARKS.—The two cases of acute abscess call for little remark: one was quite well in a week; the other in a fortnight, from date of incision. The cases of chronic abscess have exhibited no sign of constitutional irritation since the evacuation of the contained matter. Both have been much relieved by the procedure; and, as yet, without the risk and dangers which not uncommonly follow the emptying of large

collections of matter. Both instances of compound fracture were so severe that a few months ago I might justifiably have thought of an immediate amputation. In not one particular has there been in either case a trace of uneasiness either to patient or surgeon. The power of making incisions into large articulations, without even a fear of after trouble, is of no small interest; and one, if not both, of these patients will probably owe their limbs to the antiseptic dressing. More than once have I seen amputation through the thigh for less marked states of joint-disease. In the ovarian case, I claim nothing more than the prevention of putrefaction, in the large quantity of blood effused into the peritoneal cavity, by the dressing employed. And, too, so far as one single case may be a precedent, this shows also that the spray of carbolio acid (one to a hundred) does not irritate even the sensitive lining of the abdominal cavity. Other cases might well have been added to the list; but I have chosen these as marked instances of surgical procedure, of not infrequent occurrence, and, I might truly add, not uncommonly followed by tedious recovery or by serious after-trouble when the more usual surgical dressings are employed.

ON A REGULATED TEMPERATURE IN THE TREATMENT OF DISEASE, ETC.*

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GENERAL REMARKS.—The conclusions deducible from these observations regarding the physiological and therapeutical effects of maintaining a high uniform temperature in such diseases are the following.

1. The results are similar in kind, though differing in degree, with all the modes of application; but, upon the whole, they are more decided and satisfactory with the combined poultice and bag than with either of the others.

2. An uniform high temperature has a powerful general action on the system. But the most striking influence is exerted on the skin, free perspiration usually occurring within half an hour after the agents have been applied, and in some cases continuing for some hours afterwards.

3. In a considerable degree, as a consequent of perspiration, there is a reduction of the general temperature. This, however, is not constant; but where an increase is associated with perspiration it is not great, and does not exceed 0.2 or 0.4 deg. Should there be no perspiration, the general temperature is occasionally increased as much as a degree.

4. As a rule, the high temperature does not excite the heart, but appears rather to have a tonic effect on that organ; for in the majority of the patients there was a reduction in the number of pulse-beats per minute, and it was also generally fuller in volume. Occasionally, however, where perspiration did not appear, there was some, though not a great, increase in the action of the heart; but it is also to be observed that, when sweating was excessive, an enfeeblement of cardiac power was the result.

5. A reduction in the respirations usually occurs when these are abnormally frequent. When, however, there is no perspiration, there may be an increase in the number, but only to a slight extent.

6. According to the testimony of the patients, pain and oppression in the chest are usually relieved, and sometimes entirely removed, and a general feeling of relief is experienced. This remark applies not only to the ordinary bronchial affections, but also to those exacerbations of phthisis pulmonalis in which oppression of breathing is associated with a suppression of perspiration; for relief in that condition was obtained in the cases observed by a restoration of the cutaneous discharge.

7. Perspiration is induced in many cases of renal disease with dropsy, with consequent advantage to the sufferers, and afterwards diuresis may be more free.

8. The application of an uniform high temperature is useful in such disorders as lumbago; the pain in one of the two cases treated being entirely removed, and in the other considerably alleviated, immediately after the application.

9. Its local action on the sensory nerves is not unduly great; for, unless the heat be raised to an unnecessary height, the different media through which it is applied are not complained of by the patients.

10. Its local effect as a counterirritant, so far as is indicated by the vascularity of the integument, is considerable, and may even be so increased as to produce vesication of the surface.

With respect to the results which followed the renewal of the water every half hour during two hours—none of the applications being meanwhile removed—I have only to remark that, as they were very similar

* Concluded from page 640 of last number.

to those which warranted the above deductions, like conclusions may be predicated of them. The chief difference was, that the effects were obtained after a longer time—free perspiration in many cases not occurring before an hour and a half.

It is evident from the numerous observations here recorded, that the heat of a poultice can be maintained during any period desired, at from 110 to 115 deg., and that of a fomentation from 115 to 120 deg.; and these temperatures are as high as can be borne by the patients when continued for one or more hours. It is also proved that, when the water is only changed at intervals of half an hour, the temperature of the poultice may be restored to from 121 to 125 deg., and that of the fomentation to from 126 to 130 deg., by pouring into the bag water at 180 deg.

The beneficial effects of these applications, so far as could be observed, were more decided than those which resulted from the mustard or mustard-and-linseed-poultice in the same class of diseases. Their respective actions, I need scarcely say, are to a great extent different. Locally, mustard acts chiefly as a counterirritant; but, as we have seen, it produces pain, and, in children especially, excites the heart's action considerably. On the other hand, a continued high temperature, besides being, to a certain extent, a counterirritant, exercises a more powerful general influence, as is manifest from its stimulating effect on the leading function of the skin. The combination of the linseed with the mustard, no doubt, during the short time the extra heat is retained, produces the combined effects of an elevated temperature with counter-irritation, but the latter action preponderates. The difference between the effects of the two applications—namely, the continued uniform heat and the poultice of mustard and linseed—was well brought out in the observations on the healthy boy, which I have already detailed at length. Besides the specified diseases, there are many others in which there seems reasonable prospect of advantage being derived from these new applications. For instance, inflammatory affections of the abdominal viscera, many of the inflammations which fall more particularly under the care of the surgeon, and local cutaneous eruptions, particularly when they are little dependent on a constitutional vice.

Should Dr. G. Johnson's theory of cholera—that there is a spasm of the pulmonary capillaries—be sound (it has lately obtained the high sanction of Sir Thomas Watson), then we might anticipate that benefit would be derived from the maintenance of a uniform elevated temperature over the lungs. Whether or not this should prove to be the case, there seems at all events a cordial concurrence in acknowledging the advantages of hot applications to the abdomen.

By means of this bag, with or without moisture, we have the power of applying and maintaining heat as high as can be possibly endured, and for as long a period as is desirable, without disturbing the patient; and were this all it accomplished, it is surely a boon of some moment in a disease usually accompanied by so much suffering.

Another group of diseases of a different kind, in which the application of this principle of treatment promises to be of no small service, are those attended with hyperpyrexia. At the outset, reference was made to the very striking effects of the cold bath in that condition. As has been stated, water of any temperature between the boiling and the freezing points may be circulated through the apparatus, so that in the use of iced water we have a powerful agent for reducing febrile heat. It certainly cannot be so active as the bath; but after the latter it may suffice to maintain the reduced temperature so induced. In cases of medium severity, it may of itself be competent to lower the heat to a point compatible with the safety of the patient. It is assuredly a much less formidable and a more comfortable and convenient means of treatment, and one whose effect is more easily regulated than the cold bath. I regret that no opportunity has as yet presented itself in my experience for testing its power over the febrile state.

I have only further to remark, in reference to the chest-bag, that the calibre of the tubing of which it is made is such that, when it is sufficiently distended, it contains about eight ounces of water, and that the material and coverings are light, so that the combined weight of the bag and contents is less than that of an average poultice. In order to test this point, which is one of practical importance, I caused an experienced nurse to make three linseed-poultices, without instructions regarding the quantity of the meal, but in other respects to be as follows; viz., to be spread on ordinary cotton cloth 8½ by 9½ inches, and to have muslin on its other surface; the whole to be covered with thin waterproof sheeting about an inch wider than the poultice. So prepared, the entire weight of each poultice and its coverings was 16½ oz., 17 oz., and 20 oz. respectively—average, about 18 oz. On the other hand, the weight of the bag, when sufficiently distended with water, is about 12 oz.

Regarding its durability, it is sufficient to state that I have used the same bag in all these observations, which extend over several months, and it is still as serviceable as at first.

We now turn to the uterine bag. Hitherto no means have existed for directly fomenting or applying a low temperature to the neck of the uterus otherwise than by injecting water into the vagina; and we all know that in many cases this method is very inconvenient and of doubtful advantage. Both these ends can be accomplished through the instrumentality of this bag, with comparatively slight disturbance of the patient.

My observations have all been made with the bag alone—that is, without covering of wet lint or other material. The reason of that is, that the idea of attaching loops to it, by means of which a moisture might be applied, only occurred to me quite recently. But though I have not

Fig. 2.—Section of Uterine Bag.

a. Inlet; b. Outlet pipe: outlet one has tap at end. c. Loops for attaching covering of lint. d. Pouch for director to assist insertion.

used it otherwise than uncovered in the treatment of disease, I introduced it in one case with wet lint, first on one surface and then on both, and satisfied myself that in either way it worked quite satisfactorily. Of course, when both surfaces are covered, its introduction is not quite so easy as when only the smooth bag is in contact with the vagina. I need scarcely point out that the lint may be soaked with various medicated solutions.

The cases in which I have had opportunity or leisure to observe its effects are but few, and I will therefore briefly describe them individually.

CASE I.—C. M., aged 53, was suffering from chronic inflammation of the uterus with hypertrophy, remaining after the removal of a fibrous polypus about a year previously. She had endured pain for months in the uterine region, especially at night, and was unable to follow her employment. The bag was introduced and pushed well up behind the neck of the womb; and water on two occasions at 120 deg., and at others it was 110, circulated through it. Within half an hour from the commencement, free perspiration generally occurred. The application was made in the evening and was continued one, two, and sometimes three, hours, for six times in all. The patient stated that on each occasion the pain was relieved, and sometimes temporarily removed altogether, and that she usually obtained refreshing sleep for some hours afterwards, to which she had been previously a stranger. The alleviation of all the symptoms continued, and she shortly afterwards undertook the post of nurse, which she at present holds.

CASE II.—The patient, aged 35, had cancer of the uterus in the ulcerative stage, and was suffering severe pain. Warm water, at a temperature regulated by the patient's feelings, was circulated for two hours on each of two occasions. The day following each application, she stated that she had been soothed by it; that the heat was very comfortable and allayed the pain; that, especially after one of the applications, she had a very good night, sleeping several hours continuously, and that throughout the morning she had none of the sickness and backache which was customary in her experience.

CASE III.—M. M., aged 50, had malignant disease of the uterine neck with deep excavations. A current of hot water, as warm as she could bear it, was circulated for about an hour. At the close, she stated that she had felt the application very comfortable, and, next day, said that she had spent an unusually good night, and was easier.

CASE IV.—J. M., aged 43, had cauliflower cancer of the uterus, and

was subject to hæmorrhage, lasting often about a week, at the menstrual period. The ordinary astringent measures, internal and external, had been carried out on each successive occasion, but often with very little benefit. In this case, cold water has been circulated continuously five different times, for periods varying from half an hour to six hours, with the result of always checking the bleeding at the time. Twice, however, oozing returned after two or three hours, but at other times it did not recur for several weeks.

CASE V.—Martha Q. had hæmorrhage recurring at uncertain intervals, and lasting for a week, and occasionally nearly a fortnight; the exact cause could not be ascertained by a careful examination of the uterus and ovaries. Remedies, local and general, having failed, I circulated cold water for an hour, with the effect of at once stopping the bleeding. Next day it recurred, but again ceased immediately after the use of the bag. This time, however, it soon returned, and I thought it advisable to plug the vagina with sponge soaked in glycerine with tannic acid. On the removal of the plug, it reappeared once more, but gradually passed away.

CASE VI.—Mary M., aged 40, had disease of the right ovary of many years' duration, attended with much loss of blood at the menstrual periods throughout the last two years; and for several months the discharge had never been entirely away. Cold water was circulated in this case for five hours. Bleeding had entirely ceased when the bag was removed, and did not return till two days afterwards, and then only to a slight extent. The patient said that it was "decidedly less" than previous to the use of the bag. She now left the Hospital.

These are all the cases in which I have used this instrument. In the patient Martha Q., the plug on one occasion was apparently more successful in restraining hæmorrhage. But plugging, as is well known, is sometimes followed by dangerous symptoms. I had an illustration of that in the patient H. M. On the last recurrence of the bleeding, the bag not being in my possession at the time, I plugged by the means described in Q.'s case; but afterwards she had severe shiverings, vomiting, and great prostration, which I attributed, at least partially, to the absorption of some of the decomposed blood retained by the plug. No unpleasant effect in any case has followed the use of the bag.

Besides its beneficial action in such cases as I have described, I am hopeful that this apparatus, or other forms constructed on the same principle, may be found to be of service in gradually overcoming some cases of organic stricture, not only of the vagina, but of other passages also. Its distending power is considerable, and might be increased by employing a longer and wider inlet-pipe. In cases of vaginismus, it seems likely to be useful.

Respecting its application: When the object is to stop bleeding, the vessel containing water is raised about two feet above the level of the patient's body, so that, the bag being fully distended, the combined action of pressure and cold is exerted internally. Should we seek to soothe a painful inflamed uterus, no pressure being desirable, the vessel is elevated only a few inches, so far, in fact, as will maintain the circulation of the water.

With respect to the other apparatus, I regret that as yet I have had no leisure to test them in the treatment of disease, except in two cases, which were only imperfectly observed. I have, however, satisfied myself that they work correctly, and are applicable to the objects for which they were designed. A few remarks are called for to indicate the disorders in which they may probably be found useful.

1. *The Spinal Bag.*—Besides its evident suitability for the treatment of ordinary painful and inflammatory affections of the spinal cord and spine, the action of a regulated high or low, or alternately high and low temperature, in such diseases as tetanus, tetany, locomotor ataxy, etc., is worthy of ascertaining. Should it be possible to affect the condition of the sympathetic by cold applications over its course, it may be conveniently done by circulating ice-water through this instrument. I have applied it in a case of slight inflammation of the cord from injury, circulating hot water for an hour. The patient was certainly relieved next day; but to what extent the improvement was due to the continued high temperature it was impossible to determine, as she was receiving other treatment at the same time.

2. *Head-Bag.*—I was particularly anxious to have a suitable apparatus for the treatment of diseases of the brain, inclusive of insanity, and have devoted much thought and time to its construction. I have long been of opinion that there was considerable probability of benefit being derived from tepid or warm applications in certain forms of cerebral disorder. It is accepted as a pathological doctrine that there are two opposite states of the blood-vessels of the brain—one of anæmia, another of hyperæmia; so we might anticipate that opposite modes of treatment would probably be of service in conditions so dissimilar. And yet how seldom do we hear of heat being applied to the scalp, by any medium, in affections of the encephalon. Struck by this anomaly,

about two years ago, I prescribed warm fomentations to the head in a case of acute insanity. There did not, however, appear to be any material improvement through their action in that case. On thinking over the subject afterwards, it seemed to me that the temperature was too high, being probably from 130 to 140 deg., and had proved exciting rather than soothing to the brain. Although the results were not encouraging, my belief in the soundness of the principle was not shaken. But I felt that it was impossible to apply it with that degree of exactness which is requisite in the use of so powerful an agent, by such means as I had employed, or were then in existence. By this cap, the difficulty is entirely obviated, as any degree of temperature may be maintained as long as is desired. With respect to cold, also, it is, I think, in all respects a far more convenient and suitable apparatus for its application than the ice-bag, as ice-water may be circulated through it even when the head is resting on the pillow. I would, however, remark that it is very doubtful if real benefit is obtained by the application of a temperature so low as that of ice during a considerable period. The after-effect of a large reduction of heat in a part of the body, or in the system generally, is a reaction to a higher degree than previously to the action of the agent on which the reduction depended. This is illustrated locally in congelation of the skin by ether, and generally by the bath of very cold water. Greater permanent improvement is likely to be secured by a more moderate and prolonged reduction of temperature; and this may be effected by means of these apparatuses.

In closing, I have only further to observe that I am deeply conscious of the incomplete form in which the subject has been submitted, more especially in relation to the apparatus last described. My apology lies chiefly in the extent of the field to be overtaken. The labours of many inquirers would be required to determine the value of this mode of treatment in the numerous diseases to which it is applicable. I trust, however, that I may have succeeded, at least to some extent, in demonstrating its importance; and I hope, also, that I may have contributed means, however humble, to enable the profession to employ agents whose capacities both for good and evil are great, with that degree of precision which ought always to be aimed at in using remedies of every kind, and through which alone solid and lasting progress can be made in the science and art of medicine.

CLINICAL MEMORANDA.

CYANOSIS: MURMUR WITH THE FIRST SOUND OF THE HEART: PATENT FORAMEN OVALE.*

A FEMALE child, five months old, was brought as an out-patient to the Children's Hospital on October 23rd. Its face and extremities were of dusky colour; it had cough, hurried breathing, and much palpitation, and a distinct murmur with the first sound over the heart. I did not ascertain whether this was propagated or not up the great vessels. The child had been dark-coloured from birth, and had had convulsions at intervals. It did not seem colder than others. The mother was not strong. She had suffered during pregnancy from palpitation and faintings, and at the seventh month had fallen down stairs. The child was born at the full time. She had two other children, healthy; and she had no cardiac disease. The child was ordered an expectorant and stimulant mixture, and I saw it once more and verified the presence of murmur. A few days afterwards it died in convulsions. On the following day I made a *post mortem* examination, at which Dr. Foster was present. The fontanelle was not closed. The abdomen was distended. The chest was markedly cone-shaped, the apex being at the neck. The surface was not so dark as during life. On opening the thorax, the lungs were in part pink-coloured and healthy; in part dark and collapsed. The pericardium contained more than the usual quantity of serum. The heart was larger than normal, but in its ordinary position. The right cavities were larger than the left, and contained clots; the left were empty. The walls of the right ventricle were somewhat hypertrophied. The aortic and pulmonic valves were healthy. We examined carefully the orifice of the pulmonary artery, and there was no contraction about it; on the contrary, it was, if anything, larger than usual: it was so far larger than the orifice of the aorta that it admitted my little finger readily to the second joint, whilst the aorta admitted the same only to the first joint.† The foramen ovale was pa-

* Read before the Pathological and Clinical Section of the Birmingham and Midland Counties Branch.

† Dr. Foster has obliged me with the following measurements as to relative size of aortic and pulmonic orifices in females (from Bizot), from which it will be seen that the latter is normally the larger. The circumference is given in English inches:—aortic, 2.557; pulmonic, 2.671.