

will sometimes be found necessary to direct a course of treatment addressed to this residuary condition. A very frequent mistake on the part of the physician or patient at this stage is the conclusion that the appearances, or accompanying itching, are signs of the continued activity of the original affection, and the consequent renewal of the use of the stimulating parasiticide, which only aggravates the existing process. I have often seen cases of post-seabietic eczema in dispensary and private practice, which have been kept going for months by such errors of judgment. It must also be remembered that in prolonged cases of itch the cutaneous nerves have acquired, as it were, the habit of demanding to be scratched, and seem to require it for a long time after every visible sign of the disease has disappeared, and these cases of surviving pruritus are often mistaken for remaining evidence of the original affection, and mistreated accordingly.

Directions are always given that on the first night of the treatment all the clothes which have been worn next to the skin, — shirts, drawers, and socks, and the sheets and pillowcases last slept in, — shall be thoroughly boiled before being used again. Gloves should be baked or destroyed. It is to be assumed that every bed-fellow has the disease also, and requires treatment as much as the patient. Every member of the family should also be inspected and treated in the same way, however slight in character or extent may be the indications of the affection. I have seen the disease keep up a continued and alternating existence in a large family for a year, during which period nearly all its members underwent treatment one or more times, simply because they were not treated simultaneously. I have recently directed five members of a private family to be thus generally treated, although only two of the household at that time presented any positive indications of the presence of the disease.

As to the more general control of the affection in its well-nigh epidemic state of prevalence, it is only by drawing the attention of the profession to this activity, and to the best methods of destroying it in individual instances, that we may hope to accomplish anything, and it is for this purpose that I offer this brief contribution to your notice.

A CASE OF ACUTE FATAL NEURITIS OF INFECTIOUS ORIGIN;

WITH POST-MORTEM EXAMINATION.

BY JAMES J. PUTNAM, M.D., OF BOSTON.

THE following case is one of generalized neuritis, of inflammatory and disseminated character, involving the nerves to a greater or less extent from their roots to their terminations, and associated with changes in the muscles on the one hand, and with alterations in the central axis on the other, which may have had a slight share in producing the symptoms.

Death occurred from asphyxia on the seventh day; and at the autopsy, besides the signs of neuritis, the lungs were found crowded with small nodular hæmorrhages, and the spleen enlarged.

The patient was under the care of Dr. M. A.

Morris, of Charlestown, who kindly asked me to see him in consultation. This I did once only, and that at the beginning of his illness.

The notes which Dr. Morris has kindly placed at my disposal, supplemented by my own, cover most of the essential points. I did not have conveniences for making an electrical examination, and was partly deterred by the agitated, restless state of the patient from investigating certain symptoms as thoroughly as I ought to have done.

At that time, however, while the diagnosis seemed clear, the fatal issue of the case was not anticipated.

The patient was a man twenty-eight years of age, in good health in all respects, and free from constitutional disease of every kind. He was of a highly nervous temperament, and his father and mother are reported as having been also of nervous temperament, but otherwise well. The patient himself had been formerly laid up with what was called nervous prostration, but at the time of his illness was in his usual health. He did not use liquor to excess.

On Friday evening, November 28th, 1886, he rode from Boston to his home in Charlestown on the front platform of a horse-car, in a heavy rain storm, and got thoroughly drenched. Before morning he awoke with pain in the left shoulder and across the back.

On the following day he complained of a feeling of stiffness in his muscles all over the body; his gait was weak and unsteady, and he felt a general sense of feebleness in all his movements.

The next day he was only with difficulty able to stand or walk. In the evening of this day (the third of his illness) he was first seen by Dr. Morris, who found him complaining of pain, not only in the left shoulder, but also in the anterior muscular mass of both thighs, and of numbness in the toes of both feet. He had also noticed that he had had no early-morning erection of the penis since his illness began, which had previously been habitual.

I will here remark that the patient had been excessive in sexual intercourse during his married life of several years' duration, but not so for the period shortly preceding his illness.

There was no pain in the back, nor girdle sensation, nor any weakness of the sphincters; the pupils were normal; his gait was very unsteady, the legs tending to cross one over the other, so that he nearly fell to the floor; the heart was beating regularly; temperature and respiration were normal; heart sounds normal. Dr. Morris ordered five grs. of sodium salicylate every two hours, for the relief of the pain.

The next morning he found the patient perspiring freely, and without pain, except in the hip-joint when he rolled over in bed. He was unable to walk, falling forward on the floor when he attempted to do so. The numbness of the feet had increased, but there was no noticeable loss of sensation to ordinary tests; there was pain on pressure over both sciatic nerves and also on deep pressure over both post-tibials. The pulse was 80, temperature normal, respiration 20.

On the 29th (the fourth day of his illness) the symptoms had still further increased, but were of

the same character as before. The pulse was 80, temperature 99° F., respiration 20. The patient was feeling anxious and restless.

On the following day the pulse and temperature were still nearly normal. The patient found it difficult to raise his legs from the bed, but could with some effort draw them up and push them down.

On December 1st (the sixth day of his illness) the pulse was 84, temperature 99.3° F. The patient had been unable to draw the legs up since the previous night; he could not raise his left hand to his head, but could raise the right with moderate effort; the grasp of the left hand was much weaker than that of the right; he could flex both arms; the calves of both legs were tender to deep pressure; there was some strangling on attempting to drink, and slight cough with expectoration of frothy mucus; the patient was talkative and restless.

On December 2d the pulse was 86, temperature 99.2° F. The patient had been delirious the night before and had not slept; he coughed and raised a great deal of frothy mucus; coarse moist râles were heard over both upper fronts; there was complete paralysis of both legs; pain on pressure over both facial nerves; the conjunctivæ were congested; he had a good deal of difficulty in swallowing fluids, but took, on the whole, a good deal of nourishment.

During the afternoon of this day (the seventh of his illness) the paralysis of the upper extremities increased notably; the cough and expectoration and the injection of the conjunctivæ also increased; swallowing became very difficult.

At about seven in the evening, while propped up in bed and taking some nourishment, he suddenly began to cough and strangle, and became insensible. His wife, who was feeding him, thought that a small bit of soft bread soaked in chocolate which he was trying to swallow might have entered his trachea. On Dr. Morris's arrival, forty-five minutes later, the pulse was found to be 120, quite strong and regular; respiration barely perceptible, slow and regular; tongue swollen and discolored. There was no evidence that any foreign body had entered the trachea. He died half an hour later, to all appearance from paralysis of the respiratory functions.

I saw the patient on the fourth day of his illness, and obtained essentially the same history as has been given.

The sequence of symptoms was reported to be as follows:—

On the night following the exposure, he had pains in thighs on motion, pain in the left shoulder and back, numbness of the toes of both feet.

The next day he found it difficult to raise the left arm at the shoulder, and had weakness in walking. The day following he began to have numbness in the fingers. At the time I saw him all motions were possible, but most of them very feeble. He could still raise the foot about six inches from the bed with the leg extended, but only by the aid of a sudden impulse. The movements of extension at the knee were fairly good. The muscles of the legs were flabby and the patient was unable to stand alone, but from weakness rather than loss of co-ordinating power, and closure of the eyes did

not increase the difficulty. Deep pressure in the regions indicated was painful, but there was certainly no marked loss of sensibility to touch or pricking, though only rough tests were used, the patient's restless condition not inviting to more critical investigation.

In view of the paraesthesia, local tenderness, steady increase and wide-spread bilateral distribution of the muscular symptoms, and yet the absence of complete paralysis, the diagnosis of multiple neuritis seemed to be justified, but there was no indication at the time of my visit of paralysis of the heart or lungs.

The autopsy was made on the day after death, December 3rd, by Dr. R. H. Fitz, who has kindly given me the following notes:—

"Right side of heart distended with liquid blood; both lungs injected and moderately oedematous; punctate ecchymoses throughout the lungs in every part; spleen enlarged to nearly three times the normal size, soft, injected; liver and kidneys deeply injected; nothing abnormal in the appearance of the brain or spinal cord.

"Pathological diagnosis: nodular, pulmonary hæmorrhages; acute splenic hyperplasia."

A portion of the anterior crural, the ilio-lumbar, and vagus nerves, and part of the left axillary plexus, a portion of the diaphragm with filaments of the phrenic, part of the deltoid muscle, and a piece of one lung, were removed for subsequent examination.

It is to be regretted that these nerves and others were not removed in their whole length, especially in view of the fact that in the closely similar case reported by Rosenheim, which came to my notice within a few days after this examination, localized hæmorrhages were here and there found in the course of the nerves.

The appearances, however, in such portions as were removed, leave no doubt as to the general character of the process.

The nerves were examined both fresh, in osmic acid, and after hardening in Müller's fluid. The same pathological appearances, though varying greatly in degree, were found in all; but the best specimens were obtained from the axillary plexus and the anterior crural, and the description will therefore be based mainly upon these, so far as the examination of the hardened specimens is concerned.

The vagus nerve was not examined after hardening. In the fresh state the most marked appearance was a strikingly beaded arrangement of the myelium, due to an accentuation of the markings of Schmidt. I should hesitate to regard this as certainly pathological, were it not that it occurred in connection with further changes.

The myelium was eaten out near the annular constrictions of Ranvier, but this may have been a purely passive, post-mortem change (v. below). Here and there the myelium was swelled and had wholly lost its characteristic markings, and in spots there was an infiltration of cells such as will be described further on.

Of the phrenic, only a few terminal filaments could be examined, and these looked perfectly healthy. Had a more extensive examination been practicable, changes would doubtless have been

found, because a certain proportion of the muscular fibres of the diaphragm had wholly lost their transverse striation, and looked lustreless and granular.

The osmic acid appearances in the other nerves were of the usual kind, but the larger number of the fibres examined looked fairly healthy.

Sections of the anterior crural nerve, obtained after hardening and stained with carmine, showed under a low power a streaked or mottled appearance, as if a number of nerve-tubes here and there had been blotted out and a new-formed substance, taking the carmine stain, had taken their place. When the sections were examined with higher powers, the outlines of nerve fibres were seen more or less altered in the affected parts; yet, nevertheless, the spots seemed of a uniform red color.

The axis-cylinders in many of the nerve bundles were to all appearance normal, or nearly so, except in the spots above described; but in some bundles, on the other hand, the same series of striking changes had taken place, which will be described more at length in connection with the axillary plexus.

Here and there were foci of cell formation or infiltration, but on the whole the changes were less marked than in the left axillary plexus.

The lesions met with in the axillary plexus were of the following character:—

1. Infiltration of small round cells with granular contents, together with an admixture of cells of other kinds, especially a number having a nucleus of about the size of a leucocyte, and granular contents, but with a distinct body of a pale, homogeneous protoplasm, giving to the whole cell a spherical or oblong shape.

These were by far the most numerous toward the periphery of the nerve bundles, and especially between the sheath and the fibre, and next, around the blood-vessels, where they often formed a well-marked ring, spreading thence outward among the nerve fibres. They were also met with, however, remote from either sheath or vessels, following the course of the nerve fibres themselves; so much so, that I have some preparations of isolated fibres surrounded, at a part of their course, by quite a mass of these cells. Sometimes they were collected into columns which lay between and parallel to the nerve fibres.

I was not able to make out that any of these cells lay actually inside the nerve-sheath, except possibly in one or two instances; nor did the nuclei of the nerve fibres appear to be increased in number. Some of the cells were evidently in process of multiplication, the nucleus being divided by a sharp line into two parts. Of these I saw perhaps three or four well-marked instances.

The degree of this cell infiltration varied greatly in different sections from the same nerve.

Besides the cells described, there were numerous spindle-shaped cells belonging to the connective tissue, whether increased in number or not I am not prepared to say, and also here and there larger granular masses which may have been protoplasmic with particles of myeline, or may have been simply altered masses of myeline.

There were also large and highly granular cells, with a large nucleus and irregular, oftentimes flattened, border, which I took to be endothelial cells, normal or more or less altered.

I searched for so-called "Mast-zellen" with various aniline colors, as indicated by Rosenheim, but succeeded in finding only one or two that seemed to be characteristic.

2. The next most striking change affected the axis-cylinders, which were in some places greatly enlarged, in others more or less atrophied, in others, again, entirely destroyed.

The distribution of these changes was largely by nerve bundles; that is, one bundle might show nearly normal axis-cylinders, while in the next bundle they were greatly altered. In some sections there were whole (secondary) nerve bundles, in which scarcely a single axis-cylinder was to be seen; in others all the different changes were represented, showing that the swelling, atrophy, and disappearance were parts of the same process of destruction.

The changes were also much greater in some strands of the axillary plexus than in others.

Some of these swelled axis-cylinders occupied the entire thickness of the nerve-tube, and even the nerve-tube itself seemed sometimes to be distended. In other cases, the sections of the swelled axis-cylinders appeared not round, but crescentic, occupying half or two-thirds of a nerve tube.

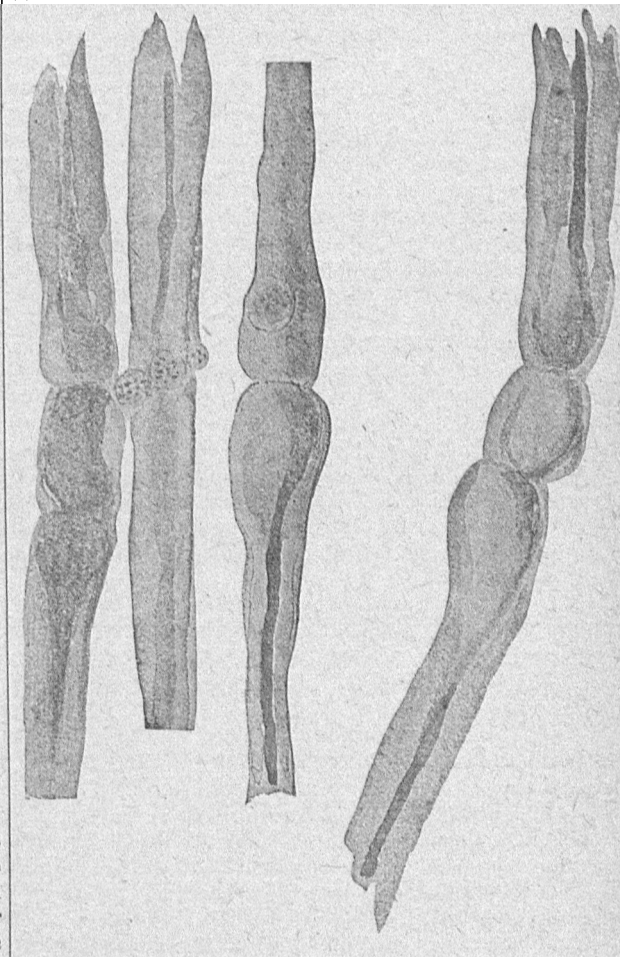


PLATE 1.—Nerve fibres with alterations in the axis-cylinders near the constrictions of Ranvier. Hartnack Immersion, one-tenth.

In order to study more closely the position and character of these changes in the axis-cylinder, I made a series of longitudinal sections, and also of

isolated nerve-fibre preparations. Through these it became evident that the swelling occurred here and there in the course of the fibre, and that its most common position was at or near the "annular constrictions" of Ranvier (or "connecting disk" of Schiefferdecker).

In some cases it was obvious what had taken place. The axis-cylinder had become swelled into a bulbous enlargement, and this had finally burst on one side, leaving half of the shell to give rise to the crescentic sections.¹ In other cases the appearance suggested more or less liquefaction of the altered axis-cylinder (perhaps the myeline as well); for the disk at the annular constriction and the adjoining walls of the nerve-tube seemed to be, as it were, plastered with a substance coloring strongly with carmine, and evidently formed of the products of degeneration. It is interesting to observe that, as a rule at any rate, the disk had not been broken through, but remained clear and distinct, although, as is shown by the experiments of Boll, Hesse, and Schiefferdecker,² on the action of water and other

ative. That is to say, it is highly probable that the swelling, etc., occurred after the death of the particular nerve fibre; but, on the other hand, it is equally probable that they did not occur in the process of the hardening of the preparation. My reason for that conclusion is, although the same kind of change—that is, swelling and vacuolization—is said sometimes to take place to a certain degree during the hardening of healthy nerves in solutions of chromic salts, yet I have never seen nor read of any change approaching to this in degree, from that cause.

On the other hand, Schiefferdecker describes, as the result of the treatment of fresh nerves with water and dilute acids, a localized swelling of the axis-cylinder, and eventually bursting of the relatively fluid contents through its envelope, which seems to be quite analogous to that which has here taken place.

It is probable that the swelling observed in such cases as this is of similar origin with that seen in acute inflammation and acute anaemia of the spinal cord.

The character and position of the myeline sheath were also of interest.

In some of the cross-sections, stained with picrocarmine, the nerve tubes could be seen to be still filled with the remains of myeline, even though no axis-cylinders were visible. At times the myeline seemed to have been changed, so that it took up the coloring matter of the carmine to some extent, and it was doubtless in part to this change that the mottled appearance of the cross-sections was due.

Here and there a tube would be entirely empty of myeline for a considerable distance, both in those cases where the axis-cylinders were preserved and in those where they had been destroyed. This may have been partly due to mechanical violence, or to changes during hardening; but it seems hardly possible that it should be entirely accounted for in this way.

The myeline at the annular constriction was, in the bichromate of potash preparations, almost always absent for a certain distance; and this also was partly coincident with the alteration in the axis-cylinder at that point, and partly independent of the latter change, occurring in some places where the axis-cylinder ran through the constrictions, as it sometimes did, uninterruptedly and with clear and parallel outlines. So marked was the displacement of myeline at these points that some of the longitudinal sections seemed to be dotted over, under a low power, with vacuole-like spaces.

It will be remembered that Neumann, in his classical paper upon nerve degeneration, points out that the neighborhood of the annular constriction was one of the places where the degenerative changes in the myeline were earliest observed.

Dr. Webber, of Boston, has noted the same fact in some unpublished experiments of his own.

To a certain extent the changes in the myeline at the annular constrictions are probably of post-mortem origin.

It is well known that Ranvier long ago pointed out that when nerves were exposed to the action of water and other fluids for an hour or so after death, the myeline on either side of the connecting disk would be found rarefied and apparently eaten away,

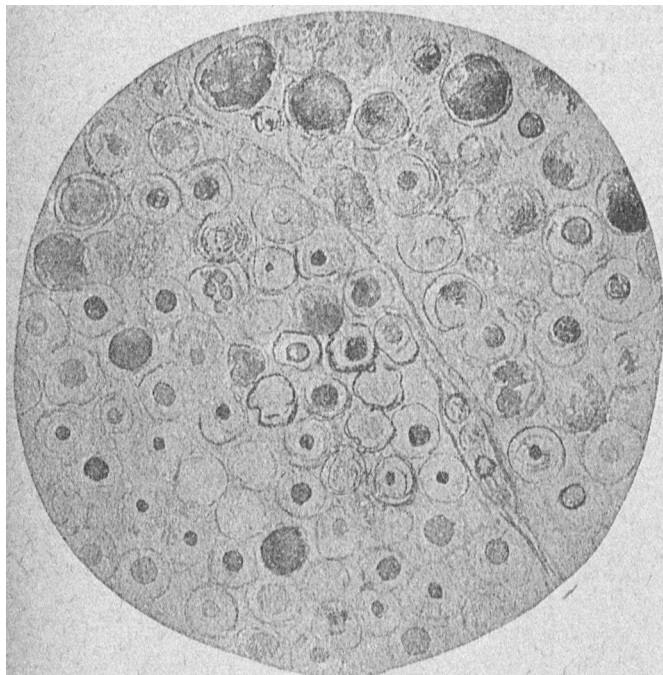


PLATE II.—Section from axillary plexus illustrating the alteration and destruction of axis-cylinders.

substances upon the fresh nerve, the osmotic or capillary current setting through the nerve fibre is quite competent to break down the connecting disk.

It is worthy of note that these changes of the axis-cylinder, though almost always near the connecting disk, are not always most marked exactly at that point, but often at a little distance back.

The question arises, Were these changes which have just been described wholly or in part post-mortem in character? In one sense I think this question can be confidently answered in the affirm-

¹ Valuable remarks relative to the significance of this acute swelling of the axis-cylinder may be found in the *Arch. f. Psychiatr. etc.*, 1887, p. 263 (Anhang). Zur activen Verand. der Axencyl., bei Entzündungen, Dr. M. Friedmann; and Bd. xvi. der Sitzb. der Kais. Akad. der Wissensch., III. Abth. Nov. Heft. 1887. Ueb. die Verand. am Rückenmark n. Zeitweiser Verschleissung der Banchl-aorta. J. Singer (Reprint, p. 12.)

² *Arch. f. Microsc. Anat.*, 1887, Bd. xxx. 485.

and that he considered this change to be an evidence of the fact that nutritive fluids probably enter the nerve at these points.

Schiefferdecker, in the interesting paper above alluded to, while expressing his agreement with Ranvier as to the fact that coloring matters, and probably nutritive fluids, find their way into the axis-cylinders at these points, does not admit that the myeline is dissolved out by these fluids as Ranvier suggested, but considers that it is displaced by the slight mechanical violence in removing the nerve from the body, or of putting it slightly on the stretch, as Ranvier was in the habit of doing as a preliminary to the immersion in osmic acid.

The reason that the displacement of the myeline took place at these particular points is believed by Schiefferdecker to be because the delicate membranous sheath of the nerve, which follows the outline of the fibre and dips down into the narrow portion at the annular constrictions, exerts a lateral pressure where the angle occurs, when it is put upon the stretch.

In other words, the stretched membranous sheath tends to assume the form of a cylinder, the end of which is as large as the connecting disk, but not larger. Consequently, that part of the myeline which occupied the neighborhood of the tapering end of the cylinder is compressed and displaced.

This explanation entirely concurred with the results of some experiments which I had been making, and which will be given elsewhere in detail.

In order to test the point further, I made a number of careful observations upon the nerves of a frog, stretching some of them with a weight of three grammes, and leaving others unstretched.

The results of the experiments were such as to entirely confirm the view taken by Schiefferdecker.

The unstretched nerves, if removed with care, did not show these changes in the relation of the myeline to the connecting disks, either after one hour's immersion in water or other fluids, or on exposure to the fluids of the body after death for twenty-four hours; whereas the nerves stretched with a weight of three grammes showed the changes very clearly, as Ranvier described them.

Occasionally, even in the unstretched nerve, a fibre is seen in which these changes are observed, but not with sufficient frequency, I think, to invalidate the explanation offered. I believe that there is also reason to think that the putrefactive changes which go on during the twenty-four hours or so after death may make this change occur more rapidly, but this point is still under investigation.

The nerves in the present case were not exposed to any special stretching other than was necessary in their removal, and it is therefore probable that the results were partly the effect of pathological change, and only in part of mechanical violence.

I have, however, seen a similar change, though not nearly to the same extent, in a healthy nerve removed from the body at an autopsy and treated with the same reagents that were used in this case.

One other point should be mentioned in this connection, namely, that the membranous sheath in the neighborhood of the connecting disk, as seen in the hardened specimens, looked as if it had been exposed to pressure from within, making it bulge slightly outward. I have no explanation to offer

of the exact manner in which this effect was brought about; but this influence, whatever it may have been (possibly the result of decomposition), may have had its share in the displacement and destruction of the myeline as well.

(To be concluded.)

SOME USES OF THE VAGINAL TAMPON.¹

BY F. H. DAVENPORT, M.D.

THE word tampon, which is of French origin, means something which is used to plug a cavity. Medically its use has been almost wholly restricted to the filling up of a natural cavity or a wound with some substance, for the purpose of arresting hæmorrhage.

Of late years, however, especially in gynecological practice, its use has been extended, so that it now serves many purposes. In discussing it in this paper, I shall not confine myself to the strict definition, but shall include under the term tampon not only the complete plugging the vagina, but also the various modified forms which have suggested themselves as useful.

These include single dressings of cotton, wool, or other similar substance, medicated or not as the case may be, several dressings packed tightly or loosely, and either partially or completely filling the lumen of the vagina, and used for a great many allied or diverse conditions.

As we have said, the first and the most obvious object to be attained by a tamponade of the vagina is the controlling of hæmorrhage. The indications for, and the methods of, doing this are so well known that it is not my purpose to refer to them here. The second most familiar use is to modify the position of the uterus. Briefly the principles for doing this may be thus stated. In the first place, from the nature of the treatment, its application must be temporary. Sometimes the object sought is to steady a too movable uterus; sometimes to alter the position of that organ when out of its normal place, but still movable; and sometimes to overcome adhesions, and gradually restore a displaced uterus to its normal position.

When the object has been attained this treatment is either entirely suspended, or some permanent device, as a pessary, takes the place of the temporary tampon.

For the first two uses, the tampon is small, occupying only the upper portion of the vagina, and keeps its place in virtue of the elasticity of the vaginal walls. From this it follows that very little force can be exerted, the tampon or dressings merely steadying, or at most slightly lifting, the uterus.

To accomplish the third result, viz., restoring an adherent womb to its normal position, a firm, solid column is used, which fills the whole vagina as far as the outlet, and exerts, especially in connection with the respiratory movement of the uterus, and moderate exercise, a steady and effective upward pressure. The exact effect of the tampon on the adhesions is not known. In all probability they are put somewhat on the stretch; and their nutrition being to a certain extent interfered with, they atrophy and become thin, and finally give way. To a certain extent also the process may be one of absorption as

¹ Read before the Boston Society for Medical Improvement, Jan. 28, 1889.