DISEASES OF THE CHEST IN CHILDREN: THEIR TREATMENT BY BLISTERS.

By DANIEL MACLEAN, M.D., L.F.P.S.G., Glasgow.

THE object of this paper is to notice a method of treatment in the diseases of children which is, so far as I am aware, novel, and which I have adopted in suitable cases with great benefit. It is a treatment for which parents have very often little partiality, but by which many lives will be saved; and if my views be correct, it is based upon a pathological groundwork, and explains numerous circumstances in connection with these diseases otherwise obscure.

Diseases of the chest hold a remarkably high place in the yearly bill of mortality; causing in Scotland the deaths of as many children of five years of age and under, as the deaths at all the other ages put together. Any means, therefore, that will modify this state of things, or even give a greater control over these diseases, is well worthy of consideration, and is a justification for bringing before you what might otherwise be deemed a trivial subject.

The treatment which I would advocate over and above the special treatment to the chest proper, is the application of counterirritation in the form of small blisters over the roots of the nerves going to the chest and those auxiliary to the act of respiration. The most appropriate spot for their application is immediately behind the ear, where there is naturally no growth of hair. The form of blister which I invariably use is the *tela vesicatoria* of the Messrs. Smith of Edinburgh; it has no specific virtue over the other forms of cantharidine counterirritation, but is very convenient, cleanly, and almost certain in its action, especially on the tender skin of children. These blisters have this special recommendation, in such cases, that they are comparatively painless, and can be allowed to remain applied to the surface an indefinite length of time, as they never produce destruction of the true cuticular tissue—only irritation, which raises the epidermis with a layer of serum below; and this serous fluid acts as a protection to the more active surface beneath. Three hours, when applied to a child, is in general a sufficient length of time; then, by substituting a layer of fine cotton-wool, a bag of fluid will be speedily produced, whose action will protect the tissues from undue stimulation. This amount of counterirritation is usually quite sufficient for producing the effect required; but should circumstances necessitate it, reapplication can be continued, so long as the blisters are thought to be of benefit. In this way we have complete control over the counterirritation, and can modify it according to circumstances.

My reason for using this method of treatment is, because there is so much nerve-force acting in excess in diseases of the chest in children, as to influence to a very great extent their continuance and their result. It is with the object of getting rid of this *vis nervosa* in excess, that I recommend the adoption of this blistering treatment in the diseases of children. The results of my use of this style of treatment have been such as to justify me in advocating it as one of our stock methods of cure in diseases such as those which I mention.

It is not of value in every case of chest-disease, nor in every stage of each case of chest-affection. Speaking generally, it is only of value in disease attended with a permanent or prolonged irritation of the mucous and elastic minute tissue of the smaller bronchial tubes and tissue of the air-cells, such as is found in the acute stage of most diseases of the chest. I have used this treatment in many cases in different diseases of the chest in this stage of irritation—when the tubes are in the dry, congestive, or inflamed condition of the disease—and I find that the patient quickly improves; the respiratory murmur becomes soft, and the moist mucous *râles* are developed in a comparatively short time, before the child has become weakened either in body or in lungs. The convalescence is much speedier, with fewer fatal mishaps than took place previously from the full virulence of the complaint being only attacked at one point, viz., in the lungs themselves. All these diseases influence the whole body as well as the lungs, besides being themselves influenced and kept up by the general condition of the whole system, more especially through the agency of the nervous system.

I do not propose to give in detail the cases in which I have applied blisters to the head in chest-affections, but only to mention generally those in which the greatest benefit is to be gained from this procedure. Like others, I have been often baffled by this class of diseases, and believed that there was some other factor or factors at work besides the local alteration of texture; and, from the frequency with which nervous symptoms appeared, was led to believe that the brain or nervous system was the disturbing influence at work. I had the care of a child about a year old, who baffled me for some time. There were no apparent head-symptoms; the child was out of sorts, restless, uneasy, and

fretful; the skin was hot, the respiration hurried; there was a dry irritating cough, and the child refused to take food. All over the chest in both lungs the respiratory murmur was harsh, rough, and tubular; no moist *râles*, no crepitation, no rhonchi. This condition continued for some time, and the child was losing flesh, notwithstanding the use of almost all the remedies usual in chest-affections, till I persuaded the father (with the greatest difficulty) to allow me to apply two small blisters—one behind each ear, for three hours. The next day the breathing was easier, the restlessness greatly subdued, and the respiratory murmur became moist and soon natural, all of which was the precursor of a speedy recovery. Another case of the same character came under my care; the same difficulty was experienced in removing the disease; but the father, being a man of intelligence, on the reason being explained to him, at once permitted the application of the blisters; after which the alteration in the condition of the child became in a very short time so marked, that there was no difficulty in tracing the result to its proper cause.

I also use the blisters in the bronchitis of children when I am called in the early stage of the disease, before the supervention of the moist mucous *râles*, notably in the first or dry feverish stage of the complaint. Bronchitis is a complaint occurring so frequently, that people become accustomed to it, and object to what they consider the cruelty of applying blisters to young children, and refuse to permit their application at the only time when they can be of use; but would often wish them put on in the advanced stages, when, instead of doing good, they do harm. Thus I have not had the privilege of applying them in all cases of bronchitis; but where I have had the opportunity, in the proper cases and at the proper time, I have invariably shortened the disease and had speedy recoveries.

In measles, also, blisters applied as I recommend are desirable. Although this is not strictly a disease of the chest, yet in every case the lungs are involved as much as if the origin of the ailment had its seat there. When the disease has a fatal termination, it comes generally through some lung-complication, or through some alteration of the cerebral centres, such as convulsions. The latter complication is not an accompaniment invariably attending measles like the chest-affection; but nervous derangements occur so often that it shows an intimate connection between the two, and unmistakably points out for adoption the principle and practice I wish to establish. In measles, I generally apply the blistering treatment both as a means of cure to the chest-complication, and as a preventive to the development of cerebral symptoms. In all cases I look out for nervous symptoms, as I believe they always indicate a very severe phase of the malady. The sudden disappearance of the rash in measles is often followed by an outbreak of some affection of the brain. It is, therefore, at all times wiser to be prepared for such an emergency by the adoption of treatment which will have a tendency not only to prevent such an occurrence, but will at the same time relax the excited and congested bronchioles and air-cells. The same treatment by blisters holds good as well in cases of infantile pneumonia, during the first or congestive stage, when there is a determination of blood to the pulmonary capillaries and increased activity in all parts of the lungs. Of course, this treatment is founded upon the same principle as in the other diseases of the lungs, and is applicable to all diseases in which the same conditions hold good.

All the different diseases which I have mentioned—bronchitis, pneumonia, measles, and congestion—it will be observed, may be divided into two classes; those that begin in the lungs, and those that have their origin in the nervous system. But, although the origin is different, the result upon the lung in the first stage is the same, and justifies the adoption of the same method of treatment.

By this method of applying blisters behind the ear, I believe that I shorten the duration of the disease; reducing the length of the first stage, and hastening the recovery. The irritated condition of the minute tissue of the bronchial tubes and air-cells, with the determination of blood towards the parts, being removed, the moist stage of the disease is quickly induced; thus, generally, preventing the exhaustion of the body and lungs, which takes place if the disease be allowed to run its course, or if we must wait till it submits to our usual pulmonary remedies.

This method of treatment is not only of practical value, but also involves a pathological principle of action, which is of the first importance, and which is in force not only in the case of children, but of adults as well, although not so apparent, and not at present under discussion; viz., the important part which the nervous system plays in disease, and especially in disease of the lungs. In children, this part of the organism cannot be ignored, and is on all hands admitted to be proportionally in extra activity—necessary, during early life, to fulfil the purposes of growth; and it thus becomes a factor whose influence cannot be safely overlooked during disease. In the condition of parts

to which the blistering treatment is applicable, the reflex action of the nerves supplying the lungs plays no secondary part in exciting, continuing, and modifying the abnormal action going on.

We must remember that the air-sacs in children, as well as the ultimate bronchial tubes, the terminal dilatations, and the alveoli, being smaller than in adults, when from any cause contraction takes place, these become still smaller. Their capacity being diminished, and the blood-vessels having become less in diameter through the forcible application of the elastic tissue, less air enters the air-vesicles, less blood passes into the capillaries, and there is less freedom in the transfusion of the gases—necessary to health—from the increased thickness of their walls: we have thus increased frequency of respiration, and diminished aëration of the blood, so that there is a condition inherent in the parts themselves which enables the smallest cause to act prejudicially.

Supposing a case of bronchitis be taken as a typical example of the action going on in the body: there is first the exciting cause or "cold" invading the lungs through the tubes, acting upon the mucous membrane as a local irritant, interfering with its normal nutrition, and deranging its circulation. This effect of irritation is not confined to the large and small bronchial tubes, but also affects the air-cells with the pulmonary circulation, though to a less extent. This irritation stimulates the minute tissue to increased action, and we have contraction of the elastic tissue, with an increased flow of blood in the capillaries, causing active congestion, which implies contraction of the capillary vessels. This contraction of the elastic tissue should cease so soon as the exciting cause—the "cold"—was removed. This does not take place, because the contraction and congestion of the parts are continued long after the cause is removed; because, besides acting as an irritant to these, it also has raised an action or irritation on the periphery of the nerves, thus irritating the filaments of the pneumogastric nerve through the afferent fibres; the impression is carried to its ganglionic centres, and thence, by the reflex process, is sent through the efferent fibres back to the already irritated and excited minute tissue, contracting still further the capillaries and elastic tissue. The original irritation is thus followed by that produced by the action of the nerves, and that process is kept up till the nervous action ceases through exhaustion. By this time the tissues involved, and very often the body itself also, are exhausted; too late, probably, for the little patient.

Dr. Roberts, in his article on Bronchitis, in Reynolds's *System of Medicine*, says that "cold," besides acting, as I have mentioned, on the mucous membrane, operates secondly "by acting upon the system at large, in some way or other not understood; the bronchitis being only a part of the general disturbance." This little understood part of the process going on in bronchitis is explained, by taking into account the stimulation of the nervous system in connection with the local affection. It is not an explanation of all the symptoms in connection with the disease, but it accounts for most of them. You cannot have disordered function going on in any part of the body, without its influence being felt, more or less, throughout the whole; and if deranged tissue-function affects the body, how much more will the deranged nervous function affect the general system, considering how easily and readily impressions are carried along their filaments.

Besides the irritation going on at the periphery of the nerves, influencing the tissue to which the filaments are distributed, this influence is not without its effect upon the ganglionic centres themselves; and cannot fail, by being continued for a length of time, to produce a pathological action there also. No organ in the body can be kept, for a length of time, in a state of irritation, without affecting its minute tissue, and producing, by its increased action, an increased growth of a low type among its cells, making them incapable of performing their proper work. This seems to be what takes place in the cerebral centres, and they cannot be expected to escape the operation of the usual law; so that, by long continued action in the filaments of the nerves, the nerve-cells are themselves ultimately affected, and we have at length, what is met with very often as sequelæ of disease in the chest—nervous symptoms, convulsions, and, probably, effusion into the ventricles. Anyone at all conversant with the diseases of children has to lament, too frequently, this result following disease in the chest; and to my mind the explanation is quite clear.

Thus we have, in the diseases to which I refer, an action and reaction going on, the chest upon the brain and the brain upon the chest. To this fact is to be attributed the increased mortality among children from diseases of the chest; they are less stable in the materials of which they are constituted; they are more susceptible to external impressions; their nervous system is, so to speak, too highly strung; and we thus account for the little understood conditions mentioned by Dr. Roberts.

The converse of this state of matters also holds good, as is to be

expected, if the principle advocated be true; viz., that diseases of the brain and nerve-centres produce disease or disordered function at parts distant from themselves—notably, in the lungs. Should an abnormal action be going on among the cells of the brain, it is impossible that an influence should not be sent along the nerves which arise from them, unless the abnormal action has advanced so far as to destroy the central cells. From the close connection between the ganglionic cells and the nerve-filaments, any irritation or stimulation among the cells will pass along the nerves to their periphery; and, unless it be denied that the nerve-filaments have any function to perform in the parts to which they are distributed, this central irritation will cause irritation and contraction of the elastic fibres of the air-cells and bronchioles; and, in this way, you have an abnormal action taking place in the lungs, from a disordered or diseased condition of some of the nerve-cells of the brain or nervous system.

We have thus in the chest, disease arising in the lungs from some cause external to themselves; and we have disease in the chest from some cause seated in the brain. The class of cases first mentioned, where we have increased respiration, tubular breathing, etc., in which I first applied the treatment by blisters behind the ear, is an example of abnormal action in the lungs, arising from disorder in the encephalon. The affections of the lungs in measles have also their origin extraneous to the lungs themselves. Some authors also speak of diseases in the chest from the reflex action of the dental nerves in teething; and, as examples of affections of the lungs arising in the chest itself, no better could be obtained than those of bronchitis and pneumonia. In whooping-cough, we have another example of an irritation of the nerves causing disease of the lungs; here we have the action of the nerves of a different character, acting upon the minute tissue of the lungs only at intervals, and by the powerful spasmodic contraction and relaxation its tendency is to exhaust the tissue, as I have pointed out in my paper on the Open Air Treatment of Whooping-Cough, in the *Glasgow Medical Journal* for last year. In this disease there is the interval of relaxation, which gives the tissue time to recover itself so far from the effects of the nervous action; but, in the cases under consideration, the baneful influence at work upon the tissue is prolonged without intermission, and what is required is to remove for good what takes place in whooping-cough only now and again.

If the opinion thus given, as to the important part the pneumogastric nerves and ganglionic centres play in these diseases, be correct, in what way can we turn this knowledge to account, and reduce the disease itself to a minimum? There may be other modes of effecting this object, but, as I have indicated, the placing a blister at or near the course of the nerve, between the irritated terminations of the nerve-filaments and the irritated ganglionic nerve-cells, has given me convincing evidence, in the results, that the action going on between these two parts has been stopped; at all events, symptoms, indicating that such an action has ceased after this application, have established the fact as strongly in my mind as if it could be demonstrated.

The explanation of the use of counterirritation in this manner is, that it comes between the two spots where nervous action commences, and this new centre of irritation acts as a tap to the nervous force here, and diverts it from its usual course. The *vis nervosa* coming from the lungs, and the *vis nervosa* coming from the ganglionic centres, are both stopped at this point, and their energy, being expended in this new inflamed tissue, does not proceed further to keep up the pathological action either in the lungs or in the brain. In fact, from whatever part the irritation comes, by this means it ceases to be reflex action. Commencing in the minute tissue of the air-passages, it passes along the afferent filaments of the nerves till it reaches this new centre of irritation, and there expends itself, not passing to the ganglionic cells of the brain; and, in the opposite direction, the influence coming from the brain ceases at this point also; so that the reflex action is removed, and the irritated terminal points have time to recover their wonted condition. I consider that this action of the blister has much the same power, though less permanently, as could be attained by the division of the nerves at the same part of this course. Section of these produces diminished respiration, relaxation of the elastic fibres, with retarded flow of blood through the capillaries, and effusion of serum from these vessels. Blistering over the course of the nerves produces a state of things much the same, only of a temporary character, and not so extreme. During the action of the blister, which can be continued or removed, the hurried respiration is moderated, the dry vesicular murmur is removed, and we have the exudation of the natural secretion from the mucous membrane, so that we have remaining only what Dr. Laycock calls the *vis nervosa* of the tissues themselves. The great factor, whose action so powerfully affected the original malady, having been thus removed, the parts soon recover their original

tone, not having been subjected to the long continued exhaustion which follows the unimpeded action of the reflex power playing through the pneumogastric nerves. Moreover, the system generally does not suffer to the same extent, and, consequently, recovery is much more rapid and satisfactory.

When disease in the chest arises from some abnormal action going on in the encephalon, the blisters remove the chest-disease, and we are at liberty to direct our efforts to the cerebral disturbance, thus limiting our remedies to a smaller morbid locality; and, the body submitting to only one focus of injury, the disease in the chest, being removed, ceases to act as a stimulus to that of the encephalon.

Some objections may be raised to this explanation, as involving a new theory as to the action of blisters, as well as the new theory mentioned previously, in reference to the pathological action of the nervous system in diseases of the chest. I am one of those who believe that blisters act as stimulants, but not that their stimulating action does good only through the nervous system, and through that alone, as is believed by those who call themselves "Young Medicine." Dr. Anstie is, perhaps, the clearest exponent of their views; and in the *Practitioner* for March 1870, he says of blisters, that "they are the refuge of the destitute." He will probably object to the explanation given; but even he, in his anxiety to confound those who differ from him, and to establish his own views, contradicts himself in the seven propositions which he gives in explaining the action of counterirritants. In some of his views I am at one with him; but, in others, he is as unsatisfactory as he accuses his opponents of being. It seems to me that blisters act in different ways under different conditions. They act by diverting nervous force; they act by exhausting tissue-contraction; they act by the stimulation of glands and tissues; and they act by stimulating reflex action; but that blisters are only "the refuge of the destitute" I deny. Guided by observation and experience, they may become handmaids to the wise, and afford a harbour of safety for the destitute in health.

THE CAUSES AND PATHOLOGY OF THE VARIOUS ACQUIRED MALPOSITIONS OF THE UTERUS.

By T. D. GRIFFITHS, M.D.Lond., Swansea.

THE term *malposition* is taken, in the present instance, to include prolapsus, and the various acquired versions and flexions of the uterus. It is chosen in preference to *displacement*, as the uterus is one of the most movable organs in the body, and possesses a considerable latitude for variation in its position, which should be considered as normal.

In order to elucidate the proximate and most obvious causes which tend to produce uterine malposition, and which are practically of the greatest interest, it is necessary to notice briefly the general anatomy of the female pelvis; the mobility, flexibility, and variability in the size of the uterus; certain pathological conditions of the uterine appendages, their neighbouring organs and tissues, general malnutrition, and certain muscular efforts.

General Anatomy of the Female Pelvis.—The uterus is retained in its natural position, between the bladder and rectum, by the broad ligament on each side; the fundus, scarcely reaching the brim of the pelvis, is directed upwards and forwards; the posterior surface, which is more convex than the anterior, is free, and covered by the peritoneum, which is reflected from the cervix uteri to the posterior wall of the pelvic cavity in front of the rectum, and in this situation, where it forms the recto-uterine pouch, it dips below the level of the cervix. Here the partition between the peritoneal cavity above and the vagina below consists of serous and mucous membranes, with some intervening muscular fibres and loose areolar tissue; this structure (recto-uterine ligament*) forms a portion of the wall of the peritoneal cavity. The anterior surface of the uterus is also free except at the lower fourth, where it rests, as it were, on a cushion, and is firmly attached to the bladder, and supported *in situ* by the recto-vesical fascia.

The peritoneal cavity is limited in the pelvis by a somewhat horizontal diaphragm (pelvic diaphragm) consisting of the bladder, uterus, and its ligaments. The outlet of the pelvis is closed by powerful muscles and fasciæ, which are supplementary in their function to the pelvic diaphragm.

The Mobility and Flexibility of the Uterus.—Although the uterus is a highly movable organ, it is not equally so in all directions, and this

is an important point to be remembered. The upper and heavier portion is freely movable in the antero-posterior direction, but greatly limited in its movement laterally by the broad ligaments. The organ as a whole is capable of a considerable movement in the vertical direction, which forms an arc of a circle in the pelvic cavity, having its centre in front of the pubes. This curved direction is determined by the greater fixity of the anterior attachment of the cervix.

The uterus, more especially in the virgin state, is capable of resisting flexion to a considerable extent in virtue of the thickness of its wall, but the organ is not equally rigid in its whole length, it is more easily bent at that part which corresponds to the inner os, or thereabouts, and it is here (in a line between the upper part of the vesico-uterine attachment, and the point at which the peritoneum leaves the posterior part of the cervix) that flexion takes place.

Variableness in the Size of the Uterus.—Increase in the size of the uterus plays an important part in the causation of uterine malposition, which will be more particularly considered under the head of pathology. Suffice it now to notice only a classification of its various enlargements.

LARGE UTERUS.

(1) Physiological enlargement.

- (a) Very slightly during the access of menstrual periods.
- (b) During pregnancy and period of involution.
- (c) After involution or postpuerperal, one-fourth to one-third larger after than before parturition.

(2) Pathological enlargement.

- (a) from congestion.
- (b) " inflammation.
- (c) " hæmorrhage (peri- and intra-uterine).
- (d) " hypertrophy (hyperplasia).
- (e) " imperfect involution.
- (f) " tumours (heteroplasia).

Certain Pathological Conditions of the Uterine Appendages, their neighbouring organs and tissues, should occupy a place in the etiology of uterine malposition. It is evident that imperfect involution of the broad ligaments after parturition, inflammation of the ovary, ovarian tumours, etc., are capable of influencing the position of the uterus. Again, tumours, or over distension of the bladder, may displace the uterus backwards; fecal accumulations in, or tumours of the rectum, may attain to such a size as to push it forwards, upwards, or both; abdominal tumour, or fluid in the peritoneal cavity may, under certain circumstances, bring about flexion, version, or prolapsus, but in these cases the malposition of the uterus is of secondary importance. Finally, the soft structures guarding the outlet of the pelvis are not unfrequently damaged in parturition, so as to allow the uterus to descend below its natural limits.

A state of malnutrition of the system generally, and of the uterus and its appendages in particular, is perhaps one of the most frequent disturbing influences which affect the position of the uterus. This pathological condition may be brought about in one of three ways; namely, by defect of nutritive material in quantity and quality; by retardation and perversion of the nutritive process caused by some local disease, or diathetic condition of the system; or by some anti-hygienic surroundings, or enervating habits in which the patient has been indulging. A state of defective nutrition, in whatever way induced, is attended with a loss of elasticity and resisting power, conditions extremely favourable to uterine malposition.

Muscular efforts, more especially of the abdominal wall and thoracic diaphragm, should only be mentioned in this place to complete the list of important elements in the production of uterine malposition, as it will be more particularly considered under the following head.

Pathology.—In the normal state there exists an equilibrium between the weight of the uterus, and the resistance offered by the surrounding structures, by means of which the organ is supported in its natural position. It is our province now to consider the mode in which this equilibrium may be disturbed so as to result in malposition. It is very evident that an increase in the weight of the uterus without, and *à fortiori* with, a decrease of the resisting power of its ligaments, may suffice to affect its position. Again, the same result may be produced by an increase of pressure brought to bear upon the uterus and its attachments by a forcible action of the thoracic diaphragm, and abdominal wall, or by an increase in the superincumbent weight due to various diseased conditions of the abdominal organs. Although these propositions constitute the actual and ultimate explanation of uterine malposition, a more detailed account is necessary to explain its production, and the conditions which determine its varieties. It is observed that the abdominal wall, pelvic diaphragm, and soft structures closing the outlet of the pelvis, move synchronously with the respiratory movements of the chest.

* Recto-uterine ligament is taken here to include (for the sake of brevity in description) the whole of the soft structure, limited on each side by the broad ligament, which attaches the uterus to the posterior wall of the pelvic cavity.