

the presence or absence of tuberculosis, and then only the new therapeutic method will become a blessing to suffering humanity when all cases of tuberculosis are treated in their earliest stage, and we no longer meet with neglected serious cases forming an inextinguishable source of fresh infections. Finally, I would remark that I have purposely omitted statistical accounts and descriptions of individual cases, because the medical men who furnished us with patients for our investigations have themselves decided to publish the description of their cases, and I wished my account to be as objective as possible, leaving to them all that is purely personal.

THE OPERATION FOR SIDEBONES.

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I receive so many communications asking for information as to the method of performing the sidebone operation that I think it likely my original communication was not very clear. I have therefore availed myself of the offer of space in this Journal, and the courteous proposal of the Editor to fully illustrate this method of operating on the foot.

We are quite safe in saying that the lameness in sidebone is either removed by the operation of hoof section, or else it is unaffected by it. If the latter, it is, I believe, due to certain definite causes, such, for instance, as the sidebone being complicated with ringbone, deposits on the pedal bone, either on its laminal or plantar surface, or even complicated by changes in the navicular bursa. That these complications do occur can be readily ascertained by the examination of museum specimens, and it is certain that such cases are not benefited by increasing the capacity of the hoof, which is the *rationale* of the sidebone operation.

Errors in diagnosis must also be taken into consideration. Sidebones may exist without causing lameness, or, on the other hand, a cartilage may still be partly elastic and yet ossification may be slowly spreading upwards, and be the actual cause of the disturbance. Errors in diagnosis may tell as much in favour of as against the operation. I lay much more stress on a complicated sidebone as a cause of failure.

The foot of the horse is elastic at its posterior aspect, and its size is increased when the weight comes on the limb, the increase in size being not only in a lateral but also in a downward and backward direction. I am aware that these facts are not generally accepted, but I hope to demonstrate them beyond all shadow of doubt in an article on the "Physiology of the Horse's Foot" which I am at present engaged upon. If we will accept these facts as a temporary measure, they will assist us materially in understanding the functions of the lateral cartilages. The space between the two cartilages is filled up with the elastic pad of the foot—the fatty frog, and the outside of each cartilage is covered by the coronary secreting substance and the sensitive laminae. So long as these cartilages are in a healthy condition they perform certain movements associated with the expansion of the foot, the

greatest amount of movement being at their posterior part, and the least amount at their attachment to the pedal bone. When ossification of the cartilage occurs, it probably in the majority of cases commences at the wing of the pedal bone, and extends upwards. I do not think we can estimate the amount of pain this conversion of cartilage into bone causes, or even whether in uncomplicated cases it is always attended by the process of inflammation, for I do not think inflammatory action is a necessary accompaniment of cartilage conversion, though a great deal no doubt depends upon the cause which has operated to excite this conversion. I doubt greatly whether the cartilage has much feeling in the matter in many of the cases, and I do not regard the lameness in these as due to pain in the substance of the cartilage itself, but rather to the pressure exerted upon the extremely delicate tissue which we know is found on its external face.

As the process of ossification advances the cartilage swells from the deposition of bone in its substance, and becomes very unyielding. The swelling causes the sensitive laminæ to be considerably compressed between the horny wall and the ossifying wall, and intense lameness follows. Apart from this as a cause of lameness, we have the elastic cartilages being converted into rigid ones, we have the elastic foot being converted into a non-elastic one, and until this is thoroughly established, and the parts have accepted the change in their nature, a certain freedom and elasticity in the use of the limbs is denied. In either case the lameness is mechanical. I by no means deny the presence of an inflammatory cartilage in some cases, which in itself would be sufficient to cause lameness, only, instead of putting this as the principal cause, I regard it as the most uncommon.

But I may be asked, What about the heat which can be felt over the quarters of the foot, does this not indicate the presence of inflammation in the cartilage? No! it indicates disturbance in the sensitive laminæ covering the cartilage. I lay stress on this point, for it was arguing on these lines which lead me to adopt hoof section, and the results of the operation have justified my views. The stoutest opponent of the laminal theory of lameness will not deny one fact patent to all, and that is that the hoof at the upper part, near the coronet and for some little distance below, will bulge considerably during the growth of a side-bone, and that bulge is carried by the animal all its life. I assist this bulging, I make way for it by enlarging the hoof, and so considerably facilitate matters and shorten the period of lameness. That the hoof does enlarge can readily be seen; in fact, where no enlargement follows the operation, I am inclined to doubt my diagnosis, even if the animal be restored to soundness.

At one time I made careful measurements of all feet before I operated upon them, but pressure of work and the uselessness of repeating established facts time after time have prevented me from carrying this out regularly in all cases operated upon since my paper was published. Sometimes the coronet will enlarge to such an extraordinary degree that the foot becomes larger on its coronet than on its ground surface. The largest recorded increase in size of the coronet is 2 inches. The rapidity with which the incisions in the hoof get filled up is surprising, the horn being secreted by the sensitive laminæ; I have many times found it necessary to deepen these in the course of three weeks or a month, and always do this when a case is not making that rapid pro-

gress which it should. I have a case in mind where I operated upon the same foot twice at intervals of a year, the horse remaining sound during the intervening eleven months. The animal has continued sound since the last enlargement of his hoof.

At one time I only used two incisions in the wall, but a very enthusiastic operator, in whose hands the operation yielded excellent results, induced me to try three incisions, and I have used as many as four. There can be no doubt that these multiple incisions are attended by the best results.

I do not think that it makes the least difference to the case whether the incisions in the wall are made with a saw or a knife. I use the former as more convenient, but a knife might be better in the hands of a person who was frightened of going too deep with the saw, or I should use the knife myself if I experienced great difficulty in cutting through the wall at the coronet, a place by far the most difficult, and obviously the most important, to thoroughly divide. If we can suppose a case failing which ought to be cured by the operation, that failure will be found to be due to incomplete division of the wall at the upper part of the incisions. Such a case receives no benefit from the operation. Make the incisions in the wall from the coronet to the ground surface, avoid the coronary secreting substance, but thoroughly divide every other part of the wall until the horny laminae be reached. If a knife be used there is no difficulty in recognising one's position, as the groove is wide enough to see into, but with the saw we can only tell by the feel imparted to the hand through the instrument when we are near the laminae, by the horse flinching, and by the depth of the incision as indicated by the saw; to see this mark the saw must be kept oiled, which also facilitates its working. As I get deeper and deeper into the wall, I keep withdrawing the saw every few seconds, and look at the horn dust lying in its teeth. If this is getting pink (from blood) we know we are very close on the sensitive laminae; but we must guard against being misled even by this indication, for if the teeth of the saw have touched the coronet the appearance is produced. In sawing it must be done level and true, that is of equal depth throughout. The inexperienced operator is liable through

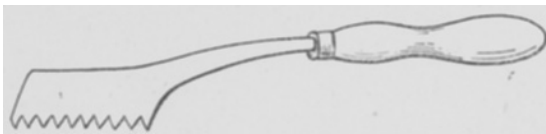


FIG. 1.—Saw for Cutting through the Wall of the Hoof close to the Coronet.

depressing his hand to have his incision deeper below than above, or even to draw blood, which confuses him for the remainder of the operation, as all the horn left in the teeth is now blood stained.

As a guide to the thickness of horn to be cut through I always examine the thickness of the crust, and I am not satisfied until my saw sinks into the wall, from the coronet to the ground, to the depth indicated by the thickness of the crust. For the purpose of facilitating the deepening of the incisions at their upper part, my saw has the front teeth reversed and a handle on the back of the blade; all one has to do now is to cut downwards stroke by stroke, avoiding any

part below which we know to be already well divided.¹ I strongly advise everyone to use a metal gauge (a thin piece of material) to introduce into the incision made by the saw, and run it up and down to ascertain whether the wall is properly divided throughout. The depth to which this should be done we know from the previous

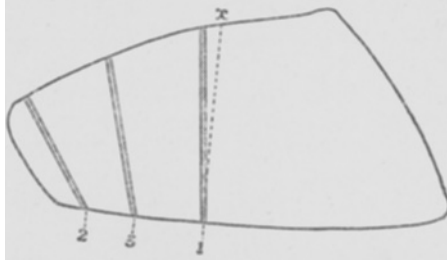


FIG. 2.—1, 2, and 3 indicate the direction of the incisions through the wall. In some feet 1 would at the coronet run farther forward so as to reach the extreme anterior portion of the side bone, but its position below would remain unchanged or else too much of the wall would be isolated to secure a shoe to. The dotted line *x* would be the direction.

measurements of our gauge on the crust. A person fond of refinement could have his gauge graduated in sixteenths of an inch. No matter what instrument we use, the operation will be of no value unless we *cut our wall from above to below completely down to the horny laminae*.

A word as to the direction and position of the incisions. The upper part of the front incision should be as far forward as the cartilage can be felt; mark this place with chalk, and drop a vertical line from here to the ground. This line, as a rule, will be found to touch the ground just behind the heel nail hole. Suppose our cartilage is very far forward, so that the vertical line cuts off too much of the foot, all we have to do is to make the line run slightly backwards towards the heel, until we are satisfied that we have left sufficient wall to nail to, for that is the sole object of making the line a vertical one, viz. *obliquely across* the horn fibres, instead of it taking the direction of the fibres themselves. The next incision is the rear one, and the position of this is ascertained by an inspection of the junction of the wall and bar. The cut in the hoof must be just anterior to where the wall turns in to form the bar, and by this we avoid cutting the bar itself; the saw is really working towards the seat of corn. Mark on the wall with a piece of chalk the part corresponding to the inflexion of the wall, and run the chalk line up the foot in the direction of the horn fibres; this line, therefore, is not a vertical one, but takes the same direction as the hoof. A third incision comes between the first and second; if the distance from the first to the second be unusually great I advise four incisions at equal distance apart.

All the lines having been chalked, stand some few yards off, and look at them to ascertain their regularity, and then mark them in by passing the saw lightly over each one so as to groove the wall.

If every detail be not carried out as described, it is not unlikely

¹ Quite recently I have improved on this method of sawing the foot, by having the teeth of the saw set wide apart so as to form an incision in the wall which will admit a penny piece. With this width daylight is admitted, and it is quite possible to see into the depths of the wall; by this means the position of the saw is exactly known, and no difficulty is experienced in ascertaining when the upper part of the wall is divided. An improved saw for the upper part of the wall near the coronet has also been tried with most satisfactory results. Fig. 1 shows the one I am now working with for deepening the incisions above.

that more of the foot will be isolated than we desired, and very little left to nail to ; nothing is more deceptive than to judge of the direction of the incisions when the foot is off the ground. The most convenient position for the operator to work in for the first incision is with the leg taken out to the front, and placed on the thigh of an assistant, as in the position of "clenching up ;" the position for the heel incision is with the knee flexed and the foot turned well up to the elbow ; but no definite rule need be laid down, the operator studies his own convenience.

In using the saw it is necessary to remember that the edge should be directed towards the sensitive parts in such a way as to make the

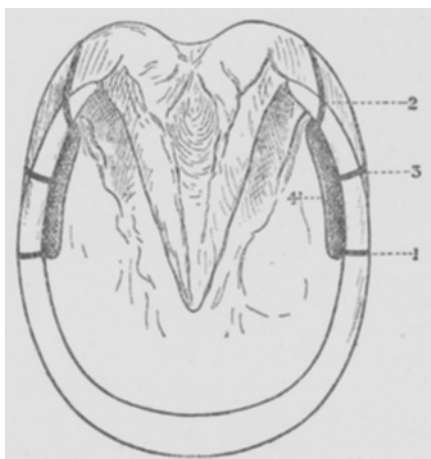


FIG. 3.—1, 2, and 3 are the first, second, and third incisions. Their direction through the crust is indicated. 4. The groove dividing wall from sole and uniting the three incisions.

incision directly through the wall and not obliquely ; by doing the latter the amount of sawing is considerably increased, as there is more substance to traverse. This remark applies only to incisions 1 and 3.

When the incisions through the wall on both sides are complete, we turn our attention to the sole. We readily see how much of the wall has been isolated by the cuts on the ground surface, and by means of a drawing-knife a groove is cut between the sole and wall, on the margin of the white line connecting all the incisions. We must work until we arrive at the blood, or until it can be seen specks here and there. In cutting and deepening this groove, it is necessary to work more on the sole than on the wall side of it, or else we will be working away from, instead of towards, the sensitive parts. When completed the isolated wall springs readily on pressure.

The next step is to take off the lower margin of the crust of the isolated wall, so that when the foot is on the ground it shall not touch (an interesting point in the physiology of the foot will here probably be demonstrated). We are not to be satisfied that the isolated crust is completely clear of the ground until we hold up the opposite foot.

For a day or two the lameness will be intense ; it only requires to be met by poultices, or, what I prefer, soaking the foot in a bucket of hot water. On the third or fourth day, or on the first day if we think fit, the bar shoe is placed on, again taking care that the isolated wall

does not touch it. Exercise may be carried out at once, but I think it prudent as a rule to defer this for the first few days, and use the hot water fomentations. Walking exercise may now be given, and then trotting. Some cases are fit to go to work in twelve days, some a fortnight, others a month. If the case has made no improvement in three weeks or a month, deepen the incisions, both wall and sole, reduce the exercise, and revert to the hot water. At the third week, sometimes earlier, remarkable changes in the size and shape of the coronet occur; the bulging of the wall at the upper part is sometimes so great as to render the foot larger here than on the ground surface. As previously remarked, no better sign can exist; our case is doing well.

The isolated wall shrinks through loss of moisture and has a tendency to turn in below, and the edges tend *to come together*; if our case is not improving, lose no time in widening and deepening these incisions. It is very remarkable how readily they fill up from below. I do not mean that they fill up to the surface of the wall, but they fill up so much as often to need deepening in a month. This is a point of physiological interest. My experience with reference to the continued use of bar shoes is that they cause the foot to contract. I am not sure that we should leave them on too long after the sidebone operation, certainly not if the foot is showing a great tendency to contraction. I have such a case at the present time under treatment, and I am going to send the horse to work with plain wide webbed shoes.

I have little more to add excepting perhaps to assure those inclined to doubt either their diagnosis or the value of hoof section that no harm is done to the foot even should the operation be of no value; it may do much good, it cannot do harm. The operation will never succeed until the inherent timidity of sawing or cutting into the wall is overcome. *The incisions must be deep, and the same depth from the coronet to the ground.*

I have tried hoof-section in cases of ringbone when the lower end of the corona was affected, but have seen no good from it; there is, however, a great future in store for the mechanical treatment of foot lameness.

An extract from the *Deutsche Zeitschrift für Thiermedizin* appeared in the last issue of this Journal in connection with the sidebone operation which I think needs some reply from me.

It would be unprofitable to criticise Lungwitz's diagnosis, but I can only state the case as it reads to me, though my conclusions may be entirely wrong. His patient had a single sidebone affecting the near fore foot, with a six months' history of lameness of a slight nature; seven weeks after the operation for sidebone had been performed the patient was as bad as ever, and lameness was now apparent *in the opposite limb*, though we are not told from what cause this arose. Six months after the operation the horse was worse than he was before. Here unfortunately the case ends, and the question in my mind is how far the single sidebone was to blame for the lameness, especially as the opposite limb became affected with a lameness apparently not arising from sidebone. The case reads to me more like one of navicular disease than sidebones, though on this point it is evident that the person who treats the case is in a better position to form an opinion than one who has never seen it.

Lungwitz concludes his case by saying that, as he anticipated,

Smith's operation would not be serviceable in *all* cases. I am sure we all thoroughly though regretfully endorse this view with reference to all diseases and treatment.

I may usefully close this notice with a quotation from my original paper:—

“There is no drug, operation, or line of treatment I know of which is infallible. The operation described must not be expected to succeed in every case, for we know that many forms of this lameness are complicated by other changes occurring in the foot. . . . I know full well that this sidebone operation will be condemned by many practitioners who have never tried it, and by others who have tried it *once* and failed to obtain benefit. I can only say to the latter try it again and again until either satisfactory or unsatisfactory results are obtained before passing an opinion.”

ON THE ANTAGONISM BETWEEN THE BACILLI OF ANTHRAX AND THOSE OF BLUE PUS.¹

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I.

THAT the pathogenic action of certain microbes can be abolished by the presence of other bacteria, may be considered as a well established fact.

M. Pasteur² had remarked that the bacilli of anthrax when inoculated simultaneously with other bacteria do not develop in the body of the animal, and do not provoke anthrax in it, and he concluded, in his broad view of things, that “all these facts perhaps authorise the greatest hopes from a therapeutic point of view.” The systematic study of this question, however, is recent, and due principally to the initiative of Emmerich,³ who, in the case of rabbits, placed the streptococcus of erysipelas in presence of the anthrax bacillus. To this effect, in a first series of experiments, he infected the animals with the streptococcus of erysipelas before he inoculated them with anthrax bacilli. In another series he introduced a culture of the streptococcus of erysipelas in *bouillon* under the skin of animals which already presented the characteristic symptoms of anthrax infection.

In a third series he studied the influence of a culture of the streptococcus of erysipelas introduced into the subcutaneous cellular tissue at a point where the characteristic infiltration of anthrax had already formed.

The last series of his experiments related to the results obtained by introducing a culture of the streptococcus into the circulatory apparatus of animals attacked with anthrax.

From all these researches Emmerich arrives at the conclusion that the streptococcus of erysipelas opposes the development of the anthrax bacilli, since he in this way succeeded in preventing the

¹ Translated from the *Annales de l'Institut Pasteur*, Nov. 1890.

² *Études sur la maladie charbonneuse*. *Compt. rend. Acad. Sciences*, 1877, t. 95, p. 107.

³ *La guérison du charbon*. *Arch. f. Hygiene*, t. vi., p. 442.