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422

THE TREATMENT  
OF  
SPINAL CURVATURE  
BY  
CONTINUOUS EXTENSION.

A MODIFICATION  
OF THE  
PLASTER-OF-PARIS JACKET,

(Read before the New York County Medical Society, January 27th, 1879.)

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THE TREATMENT OF SPINAL CURVATURE BY CONTINUOUS EXTENSION—A MODIFICATION OF THE PLASTER-OF-PARIS JACKET.

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*Extension, fixation and rest.*—These are the cardinal principles in the treatment of lesions of the vertebral column. Add to these good hygiene and judicious medication and we have the sum of all the indications.

Instrumentation can be successful, only as it meets these demands and when we speak of the *wheel crutch*, the *Taylor brace*, and the *Plaster-of-Paris Jacket*, we witness in each of these a decided advance in our progressive science.

Each of these has its merits and demerits. Each has its champions and advocates among some of our most earnest workers and practical surgeons.

It would be *well* for us, it would be *better* for humanity, if in the liberal spirit of true progress, we could, regardless of individuality, lay aside our prejudices, meet in the broad field of scientific discussion, courteously compare our notes, and profit by that wisdom which is found in a multitude of council.

The plaster jacket was a great stride in the right direction. Its simplicity attracted universal attention, and it spread like wild-fire before the blasts of its enthusiastic advocates.

Some of us thought that we had found the *ne plus ultra* in the management of Pott's disease; that sufferers had now nothing more to do but be suspended by the arms and neck, enveloped in Plaster-of-Paris and be cured.

But let us ask pointedly, has it fulfilled these expectations? Does it meet fully all the indications in Pott's disease? I believe it comes nearer it than any other method yet made known to the public, but it has failed at times; it has its faults and these I shall try to point out, and hope to suggest the remedy.

In order to obtain the first great requisite, *extension*, by this method, the patient is suspended by the neck and arms, lifted well up from the floor, the lower portion of the body is the counter-extending force, the



diseased surfaces are separated, and while in this position, the trunk is locked in the plaster jacket.

If this *grip* of the jacket could be uniformly maintained, it would meet more fully than it does the indications. But any one experienced in its use will recognize this objection; it loses its firm hold in from 7 to 10 days after its application, and hence loses its property of holding at rest and separated, the diseased surfaces.

This results from two causes, 1st, the atrophy and yielding of the abdominal and thoracic structures under this abnormal pressure; 2d, the softening and relaxation of the plaster itself from the absorption of bodily moisture.

It follows of necessity, that the support having yielded, the upper portion of the body telescopes down upon the lower, the diseased structures are grinding in contact, and *the benefit obtained by extension before application is lost by the collapse which follows.*

Hence arises the necessity of removing the apparatus and reapplying it, in itself at times painful and annoying. So I have found it, notwithstanding, I have been able to finish the dressing in ten minutes of suspension.



Fig. 1.

Again, pressure upon the protruding spine often excoriates or prevents the healing of a pre-existing sore, and although a *fenestra* is cut, it is objectionable, since the discharge from the ulcer gets beneath the dressing causing an offensive odor and removal of the jacket.

Or a fragment of plaster, or foreign body dropping between the dressing and the skin, gives rise to excoriations and requires removal of the dressing and its re-application. (1)

The method to which I now ask your attention, obviates these various difficulties.

Without suspending my patient, the arms being held out of the way by an assistant; outside of the tightly-fitting knit undershirt, I apply *two* jackets of the required thickness. The lower edge of the upper jacket is just above the diseased points and extends upward to the arms. The upper edge of the inferior jacket is just below the seat of disease, and extends down over the hips (see figs. 2 and 3.) As the plaster bandages are "setting," I place three zinc plates about 2 by 4 inches (perforated by numerous holes (See A, fig. 1) from opposite surfaces so as to prevent them slipping), in each section of the jacket. To the center of the plate (at B) is securely riveted a flattened staple of iron. One of these is fastened over the spinal column above

(1) In one of my cases I had to remove the *solid jacket* on account of several grains of corn having fallen down the patient's back producing excoriations.

and below, one under each arm and one directly underneath these over the hips. These are held securely in position by several turns of the plaster bandages, passed over them alternately above and below the *staples* which are left exposed. (See fig. 2.)



**Fig. 2.**

As soon as the jackets are firmly "set" the *extension* bars (represented in fig. 2) can be applied.

Each bar consists of a shoulder at each end, and a solid section cut with cogs and grooves which telescopes into a hollow section, with a key for lengthening or shortening, and a "spring-catch" to hold it fixed at any point. It is the same mechanism that is used in Prof. Sayre's knee-joint splint.

The shoulders are caught in the staples riveted to the immovable plates, and the requisite extension is secured by means of the key.

Mr. Harz, of Reynolders & Co., has, with creditable ingenuity, devised for me a lighter *extension-bar* (see fig. 1) consisting simply of a male screw C, which works into a movable female screw D, which secures the same extension as the *bars* in fig. 2. The key to this instrument is figured at G, and at E is a catch for locking.

The principle, the application and the mechanism of this method is so simple that I deem any detailed explanation unnecessary.

In fig. 2, the *double plaster jacket* with three extension bars in position, is seen, and in fig. 3, is a front view of the same.

The amount of extension is under the perfect control of the surgeon, and can be graduated to suit the comfort of the patient and the necessities of the disease. As the jackets yield, as they will under all circumstances to a greater or lesser extent, the extension is increased to meet the exigency and the same jackets will last through-



out the treatment. At night, or at any time while the patient is reclining, when there is not a demand for much support the middle bar is removed, allowing the patient to rest comfortably on the back.



**Fig. 3.**

It will be seen that by my method the upper portion of the body rests upon the tripod of bars which are anchored, one over the sacrum and one over each hip, and that the diseased spinal column is relieved from all pressure from above or laterally. If there exists a lateral curvature one of the lateral bars can be extended more than the other and the curvature corrected. If the curvature is antero-posterior with the concavity backward (lordosis) the posterior bar will demand extra extension, and if the convexity of the curve is backward, the two lateral bars will require extension at the expense of the posterior.

Around the portion of the body between the two jackets, a dry unplastered roller is carried moderately tight in order to retain any dressing on the sore (if this exist) and to equalize the pressure.

In figures 4 and 5, is represented a soft buckskin-padded jacket, made by Mr. Harz, of Reynders & Co., which is used for the few weeks following the removal of the plaster jacket. The mechanism is the same and it is used to guard against the accidents likely to occur to children liberated from the bondage of Pott's disease and surgical treatment. If plaster-of-Paris cannot be obtained, liquid glass, bandages immersed in mucilage, or the starch bandages will answer. Gypsum is best since it does not undergo any ferment in contact with bodily moisture, but the starch bandages are stronger and do not require to be put on so thick as the former. One-quarter of an inch in thickness will usually suffice. The screws and plates



**Fig. 4.**



**Fig. 5.**



can be made by any country blacksmith of ordinary ingenuity or can be obtained from Reynders & Co., New York.

From my notes I take the following case which is in every respect a critical test of the value of this method, since it was successfully tried under the worst possible conditions and after all other methods had been faithfully tried under conditions which should have insured a better chance of success.

I asked the mother of the boy to give me the history in full up to the time he came under my care, and I give it condensed from her own description.

CASE.—When  $3\frac{1}{2}$  years old, while sitting at the table, the child suddenly began screaming with pain in his back. He had received no fall or blow to our knowledge. The family physician was sent for, who said the child had probably caught cold, and ordered ice-water locally, and in two or three days the trouble ceased. Six months later the same symptoms recurred and with such severity the patient could not walk. The physician now suspected lesion of the spinal column, repeated the ice-water application, re-enforced by two leeches, with temporary relief. We noticed that at this time he walked a little one-sided and occasionally complained of pain in the side. A friend advised us to take him to the Forty-second street hospital in New York, which we did. After a careful examination the trouble was pronounced hip-disease, and a Spanish fly blister was ordered. Not feeling satisfied with this treatment we took the child to Dr. Taylor's Institute, where the disease was pronounced "Potts Disease of the Spine," and a brace was fitted and applied to him. Went there several times with him, but our means did not allow us to pay the sum they charged by the year, saying it would take probably three or four years to effect a cure, they referred us to a surgeon who would follow their plan of treatment exactly with the same instrument. He was there treated for several months with no perceptible benefit, and the brace was worn for nearly four years in all, until in 1876 he was so much worse that he could not walk a block without sitting down to rest. At this time we removed to Binghamton, where we consulted Dr. Burr, who removed the brace and applied the plaster-of-Paris jacket. This was worn about five months and was an improvement, as the child complained less of the pain, but as it of itself became painful and had caused an ulcer at the point of curvature it had to be removed, and the old brace was readjusted. He again grew worse, ran down in flesh, and became almost helpless. About this time a gentleman, whose son you had treated for this same disease, who happened to see the boy, sent us to consult you, and of his condition when you first saw him you can better judge than we.

I saw this boy at my office on April 3, 1878. He was so withered up by this exhausting disease that he was literally a living skeleton. Over the 2nd and 3d lumbar vertebræ there was a large protuberance projecting two or three inches beyond the normal surface, and spreading laterally several inches and this was covered with an ill-conditioned ulcer. Above this, the back had sunk in, producing an exaggerated lordosis, and the abdomen stuck out in front as in pregnancy, and to render the case still more complicated there was a marked lateral curvature, the convexity to the right side. (The patient was right-handed.)



He was partially paralyzed in the lower extremities, could not possibly move directly to the front, but shuffled along sideways in any attempt at locomotion.

I immediately applied the *solid plaster jacket* as I had done before, and believing that a cure was certain I sent him home. In four weeks his parents returned with him saying that for *the first week or two there was some improvement, but after that he had "gone back" again*. The jacket had worked loose and in the course of these two weeks the upper portion of the body had *telescoped* down on the lower, and the jacket was a failure. I removed it, and immediately applied another just like it, and with some misgiving sent him home again. *In a few weeks they returned with the same story as before.*

I then recognized that *temporary extension*, the only extension the solid plaster jacket secured, was not sufficient, that it was only a step in the right direction, and that in this case I must use an extension which I could control and regulate with mathematical precision for a prolonged period, or this boy would inevitably die, and that very soon.

I then devised and put into execution the method so fully described in the foregoing pages.

As I had to be absent in Europe for the three months following the inauguration of this treatment, I wrote a letter to a talented young surgeon of Binghamton, Dr. D. G. Burr, explaining in full the management of the case.

I am deeply indebted to him for the skill and judgment he displayed in bringing the case to a successful issue, and it was at his suggestion that I have adopted the *perforated plate*, which is less likely to slip than the smooth one. In three months and a half the jackets were removed, and the patient was cured. Not only had ossification occurred at the point of lesion, but the gradual and *continuous extension* had overcome both the curvatures.

On Nov. 26, nine weeks after the jackets were removed, Dr. Burr writes me, "I have been to see the boy, and find him as well and hearty as can be. He has gained in flesh, and is gaining rapidly, and I think the trouble has ceased," and the parents wrote me a month later that "he seems to be well, and is going regularly to school." I have reported this case in detail, because I wished to show that the child was in a very critical condition when the treatment was begun, and that under better physical conditions and under auspices more favorable in every respect, all other methods of treatment had after full and faithful trial in the hands of experts, proven unsuccessful.

In conclusion, I would advance these aphorisms :

1. That inflammation of the intervertebral substance, or caries of the vertebræ, is amenable to the same treatment as the same lesion in the ankle, knee, hip or other joints, and that *continuous extension*, regulated to suit the requirements of each case, in the one as in the other, enforces *fixation* and *rest*, and thus meets these great indications more fully than any other method.

2. That the Darroch *wheel crutch* and other instruments, acting upon this same principle, creditable to inventive genius in a former generation, have served their respective careers of usefulness, been superseded by better methods, and have properly ceased to be.

3. That among modern instruments, the apparatus originated by Dr. C. F. Taylor, has justly occupied a prominent position.

It may be made useful in the treatment of the lesions under consideration when taken in their incipiency, but that since *extension*, *fixation* and *rest* are the indications in every stage of this disease, it does not enforce these indications as does the *solid plaster jacket*, or the "Double Jacket with Continuous Extension."

I object to it, in that it *presses upon the seat of lesion*; in that *pressing upon a comparatively small portion of the body*, in order to catch a sufficiently firm hold, it is more *liable to set up local irritation at these points of pressure*; in that as an instrument it is expensive, as alike in the time required for permanent relief under its use, which is three or four years.

4. That the "Solid Plaster-of-Paris Jacket" is one of the most creditable innovations in modern surgery, the introduction of which has placed the medical profession and humanity under lasting obligations to Dr. Joseph Bryan and Prof. Lewis A. Sayre.

It is objectionable; (*a*) in that to apply it, it requires the *suspension* of the patient, a procedure accompanied with more or less annoyance and pain, and requiring a complicated apparatus.

(*b*) In that and chiefly, that it does not secure *continuous extension*. It does not *hold the extension*, gained by *suspension before* its application, owing to shrinkage of the body from abnormal pressure, and yielding of the dressing from absorption of bodily moisture.

(*c*) In that it involves direct pressure upon the seat of disease interfering more or less with the reparative process and causes unnecessary trouble in the management of whatever ulceration may exist over the seat of disease or elsewhere.

(*d*) In that the lodging of foreign bodies beneath the jacket, requires its removal and readjustment.

5. The "Double Plaster-of-Paris Jacket, with Extension Bars" which I have heretofore described, I believe to obviate these difficulties, since (*a*) it can be applied without suspension; (*b*) it involves pressure alone upon the sound structures leaving the circulation free and unimpaired at the seat of lesion where active repair is needed, it allows ready access to ulcerating surfaces when these exist; (*c*) foreign bodies can be removed without removing the dressing; (*d*) by means of the *extension bars* the *extension* and *fixation* can be daily regulated with mathematical precision, and can be constantly maintained without changing the dressing, no matter how much the jackets themselves may stretch or the tissues atrophy, and I hold that this *continuous extension* not only tends to cure the *disease* more rapidly, but at the same time, while the diseased structures are soft and yielding, will correct the *deformity* more thoroughly than any other method.

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