Measuring and Fitting Techniques of the Norton-Brown Brace

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We have just enjoyed a most instructive paper from Dr. Norton on how to find out what a brace is doing, and what it ought to do. For many years we have constructed braces without knowing their efficiency. Frequently, we receive prescriptions for different types of braces for the same back conditions, and wonder why. What is the brace doing in each case? This is one of the reasons why the investigation by Dr. Norton's committee was started.

I am going to take you back a few more years to the time when I had the opportunity and pleasure to read Dr. Taylor's paper, written when he first designed the Taylor back brace. I am speaking about the Taylor brace because I believe that most of us know it as one of the braces as much and as often used for back ailments as any other back brace.* Dr. Taylor called it a spinal assistant. His paper left a deep impression on me.

Before quoting from his paper, I would like to give a short biography of Dr. Taylor. He studied under Dr. Ginoshen at New York Medical College, where he received instruction about the diseases of the spine known at that time. No appliances had been used in the treatment of spinal disease. Fresh air and exercise only were prescribed at that time. Dr. Taylor designed a brace for his first patient in March 1857. This case was followed with two other cases in varying stages of that disease* during that year and both patients died. He had a fourth patient whose condition was so critical that it aroused him to make use of a brace.

And now I am going to quote from Dr. Taylor's paper:

"I talked with physicians and surgeons, visited the shops of instrument makers with no results. Those who felt the need for support always talked on vertical support and all instruments were constructed with that idea, but it was that idea only with no fixed point below or above. I wrestled with the idea to get fixed points which would include extremities and spinal column. The real light broke through when I finally adopted the term of protection to a diseased vertebra. I think the term in mind determined the case and thought and its consequences. I remember how my mind hovered around it as one looks for something strange, until I became totally possessed by it."

I am quoting this just to show that some hundred years ago acknowledged surgeons were spending time and effort in order to find a support for

* The Taylor brace is described in the Orthopaedic Appliances Atlas, Vol. I, pp. 183-185, which states: "The most familiar spinal brace of American origin, and the one most widely used even today, is that described by Charles Fayette Taylor in 1863, popularly known as the 'spinal assistant.'" (Editor)

back ailments. Continuing from his quotation about the construction of the brace—

"Thus the spinal assistant was composed of two uprights because with no other form is it possible to prevent lateral deviation while exerting anterior and posterior force. The first instrument had only several cross pieces, belly band and apron. The upright was made with two hinges that bent backward but not forward, in order to allow the muscles to act when they wanted to but to protect the affected vertebra in case the muscles should tire and relax."

I took the liberty of constructing a copy of Dr. Taylor's first back brace the way I could interpret it from his paper. But at the same time, I would like to impress here that it was considered as a support, and not as a corrective brace. It had three crossbars, a hinge, a pelvic band and a large sided apron. Now, he says in his paper that he wanted his patient to be able to go into hyperextension and prevent flexion; that is the reason for the hinge. Here again I am going to quote from Dr. Taylor's paper to demonstrate to you that Dr. Taylor was not happy with that brace at the time.

"The second apparatus had its uprights extended upward and later were curved over the shoulder. I very soon found it necessary to arrange stop stools and ultimately, as you know, the hinge arrangement became the means of wiring the uprights into sections for convenience of adjustment or alteration, or making it longer or shorter. The hip band, so-called, had two vertical pieces to still further prevent motion at the affected vertebrae and jostling of the apparatus."

In order to properly demonstrate the changes of this brace, I again used a cast, and tried to demonstrate Dr. Taylor's design of his second brace. At a later date he extended the uprights upward curving them over the shoulder to the mid-portion of the trapezius muscle using chest and clavicle metal pieces in connection with the shoulder straps.

Here I would like to point out that where the metal pelvic band extended downward in order to try to gain more stabilization of the lumbosacral area, Dr. Taylor again felt that changes should be made, and here I quote again: "I suspect some modifications of the combined chest pieces and shoulder straps, probably in the insertion of a curved piece of steel to raise the cross bar straps slightly above to prevent unpleasant pressure on the sternum, will ultimately supersede the chest piece, but these are only details relating to the efficiency and comfort, but with no modification of the principle as first conceived and related."

Up to the present time many changes have been made in the construction of this type of brace, but not in its principle. A plain pelvic band has replaced the U-shaped pelvic band which Taylor used in his later braces. You note that our present pelvic band conforms more to the design of the first brace. The uprights today are not hinged nor are extensions used, but are made of rigid and semi-rigid materials, spring steel or 24 S.T. aluminum, depending upon the amount of support necessary. A small anterior pad has replaced the apron and to my knowledge no chest bands are used today but only shoulder straps.

In the measuring and fitting of that type of brace I believe that we should consider what that brace is supposed to do. What is it meant for? Is it for support or is it used for correction? You should consider age,

* Potts disease, osteitis of the vertebrae, usually of tuberculous origin. The Taylor brace was designed to treat Pott's Disease of the Spine. (Editor)

sex, and most important, what it is meant to do. It will change the length of uprights, it will also change the placement of pelvic bands and crossbars. If it is a supportive brace, you will probably not use the narrow Taylor upright, but you may need complete padding from the upper cross bar down to the pelvic band in order to have a little broader surface and you may find that the pressure on the muscles will create a problem of discomfort. If you want to use that brace for correction in the dorsal area, then you should not pad it to that extent where it will be comfortable and act like an easy chair, but rather pad it so that when the patient does go into flexion it will press and be very uncomfortable. The most important thing to know is what that brace is supposed to do for the patient.

The Norton-Brown brace, in my opinion, is the only brace which was the end result of a very thorough investigation of what a brace is meant to do, the stabilizing of the lumbo-sacral joint, and in the measuring and fitting of this type of brace the location and length of the pelvic band, lower chest band and the length of the lateral uprights have definite purpose. With this brace the bony landmarks are valuable in the measuring and fitting. Dr. Norton has already said where the pelvic band is placed, the upper cross-bar approximately 3 inches below the lower angle of the scapula because it is rather easy to locate and when you have a patient with a painful back you cannot look for either the 9th or 10th dorsal vertebra. The lower pelvic band is just below the posterior-superior spines.

I have tried to point out some of the changes in back bracing which have taken place during previous years without definite proof as to the value of these changes, and I am thoroughly convinced that changes are taking place regardless of efficiency of a certain type of brace. For changes have already taken place in connection with the Norton-Brown brace. Complete corset fronts are added without emphasis which, in my opinion, is important in maintaining the three-point pressure principle. Taylor-type extensions have been added to some of the braces from the upper cross bar to the shoulder straps. Complete posterior uprights have been added to this type of brace extending from the lower pelvic band to the upper angle of the scapula, again with shoulder straps included. In asking questions about changes of this type, I have had different answers from the medical profession. In one or two cases it is a question of localizing edema post-operatively, probably using the posterior uprights with the complete padding, which may prevent some of the edema but, again, I am just mentioning the fact that changes are taking place continually in back braces and I seriously feel that Dr. Norton's investigations should have been continued. I am sure we all realize that Dr. Norton didn't have the time, nor Dr. Brown, to continue until 12 o'clock at night to try to give us the information we are all looking for, but I hope that we will again, at a later time, have further investigations, for in back bracing I believe this is of great importance to the patient and to us. Thank you.

Question Period

Question: Dr. Norton, how long do you like to have them wear this brace? How soon do you have them return to you after they have been fitted?

Now, that brings up a good point. When you know you are going into surgery, the measurements should be made on a patient pre-operatively and the first cross-bar should be fitted after the individual is up in the

brace. It should be fitted in the erect sitting position in a firm chair so that the cross bar comes over the incision and just touches the skin. It should not be uncomfortable, if they are honest. If slumping takes place, they are going to beat you but be firm ahead of time. The device produces a conditioned reflex, and after a while people will walk around and sit like West Point cadets. The bracing is carried on for a period of six months.

Question: Doctor, I have never been able to get it clear to myself, the business of sitting erect is a conscious effort on the part of the back musculature or you may slump at any time, is it not. I don't understand what makes this a conditioning treatment if the person has to be conscious at all times of sitting erect. Isn't this exhausting?

No, you could train yourself to do this. Take a military cadet at West Point or Annapolis, at the end of the four years of brainwashing into sitting erect, even at mealtimes, they come out of there like Ford cars and it will last. I've known graduates of a military academy who are just as straight as ramrods up until the late 80's. It is a conditioned reflex and it has to be kept up long enough to become automatic. Six months, with the prodding of a sore back, will accomplish wonders.

Question: You spoke about a female wearing this next to the skin. Does this also hold true in a male patient rather than over a tee shirt?

Well, you can have a thin tee shirt, I don't think that can hurt but not anything slippery or extra padding. This should be avoided.

Question: Doctor, as to the site of the upper bar. As you, in your paper, pointed out, any inclusion of the upper back just increases the lumbar flexion. I have been using, as I understand, between the 7th and 8th, where most of our forward flexion occurs, and not always getting it over the 9th dorsum, is this correct?

Yes, it depends a lot on the length of the thorax, this is just empirically 3 or 4 inches below the angle of scapula but the point is not to immobilize any more back than you have to.

Question: But what I meant was after I get over the 7th or 8th dorsum, regardless of back length, unless I can find out exactly where I am, won't I get counter-forward pressures from above?

Yes, you'll get up too high. Try to keep the brace as short as possible to do the job.

Question: Did your studies prove out this? That the most forward flexion occurs in the upper part of the spine between the 7th and 8th dorsum?

We didn't go up on that. The only bit of work we did on that actually was some of our X-rays on the Taylor brace. We used two Taylor's, the regular Taylor and a set up reinforcement. It was extremely hard to remedy motion in the dorso-lumbar junction. We didn't study the motion up in the dorsal area.

Question: How do you control the brace from riding up when they flex?

Well, number one, is to keep the groin strap narrow; number two, is to make sure that the actual motion of the hip and the brace are the same; number three, probably the most important of all, is to keep the groin strap tight.

Question: Dr. Norton, in your experiences have you had more trouble with female patients than males accepting this brace? The areas of failure we have seen have been more in females than in males.

Well, number one, they backed us down in a hurry on the original brace when we had disc. The women didn't like that at all because it showed under their dresses, and as a result of this we had to get rid of the disc and use the extended portion. Beyond that, I couldn't say we had had more trouble with the women than the men.

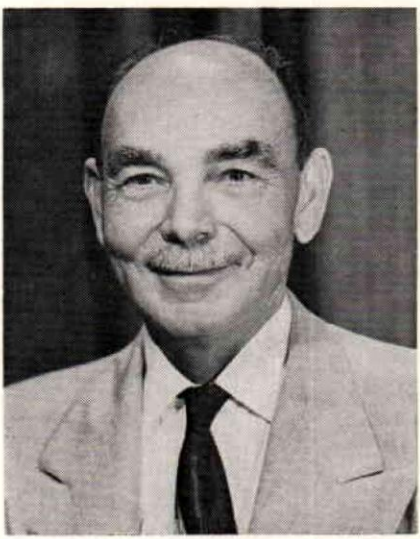
Question: What about the obese patient, is the brace as effective?

No, not as effective as with a thin person, but it will still work if you sell them the idea of really getting up and around.

Question: Dr. Norton, when you said your investigation of the Taylor back brace created more flexion on the spine than in a person who did not wear a brace, were you referring to the lumbo-sacral level of the spine or the overall?

No, the lumbo-sacral joint.

MEMBERS OF PANEL ON NORTON-BROWN BRACE



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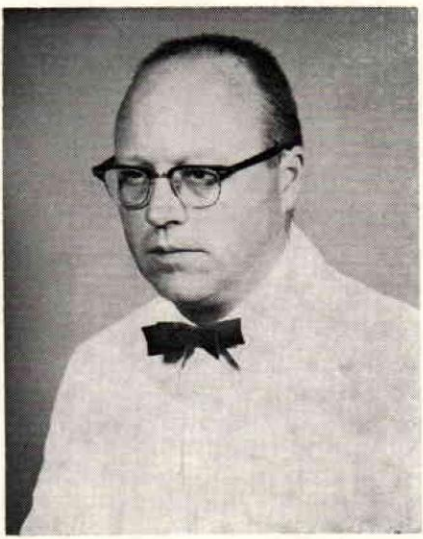

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