

# The Upside-down Flexion Back Brace\*

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For a brace to be effective, it must be comfortable so that the patient will wear it. The lordotic low back can be changed to an active flat back by training (Fig. 1, *left & center*).

To acquire an active flat back, the role of the abdominals and their deep crease at navel level is important. The lumbar spine from the lumbosacral area upward has a considerable arc range compared with that of the sacrum downward from the lumbosacral center. The lumbosacral area moves backward in space.

The Williams brace (Fig. 2) concentrates on pushing the sacrum forward, pressing round the relatively unyielding pelvis, using the long lever arm for power, not to follow range, and simulating the effect particularly of the gluteus maximus. With a tack in the rear, a firm elastic band round the pelvis can also give active withdrawal from discomfort. There is a pivot point quite high on the Williams brace; it might as well be off the top band directly and does very little moving anteroposteriorly. If a pivot point is located low (Fig. 1, *right*), near the lumbosacral level, it will float backward

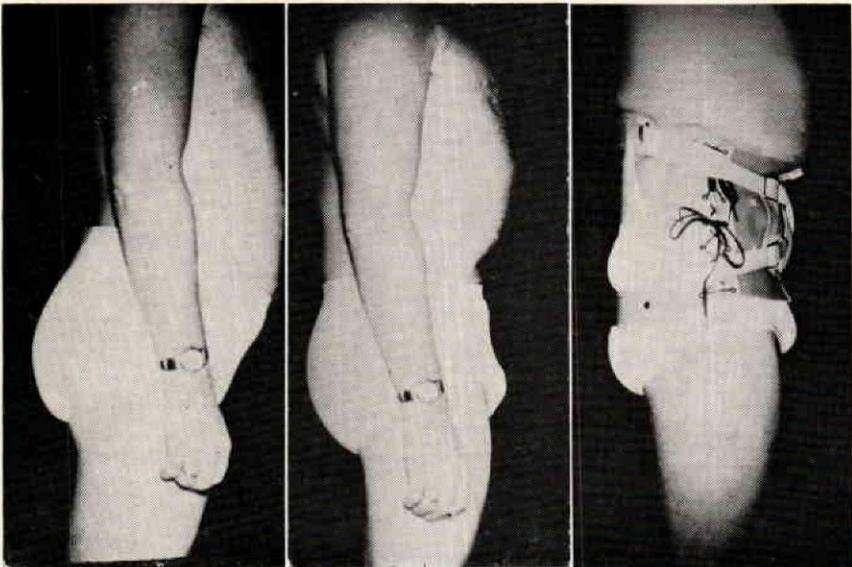


Fig. 1. (Right) Shows the upside-down brace.

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with the flattening lumbosacral area and follow similar nonbinding relations of the back and the dynamic brace parts in the new position. Therefore, the brace should be turned upside down and the pivot moved. The long lever arm, now upward from the pivot, will follow the longer arc made by the lumbar spine upward, and the short lever arm down will follow all the range that the tip of the sacrum can make in back flattening. Experience has shown that a pivot point about 1 inch below the level of the lumbosacral interspace balances the top and the bottom arcs of motion and, therefore, controls the band pressures so that there is *no need*, as Williams urges the patient, voluntarily to assume the position of "frontal attack" or lean forward. This is to avoid the appearance that the walking Williams brace gives the patient of being prodded from the low rear, which he is. The frontal pressure application is right where the patient applies it himself, across at navel level. It is not necessary to go into abdominal anatomy to prove that this is a safe and comfortable place to apply pressure; many patients well trained in flexion exercises testify to this.

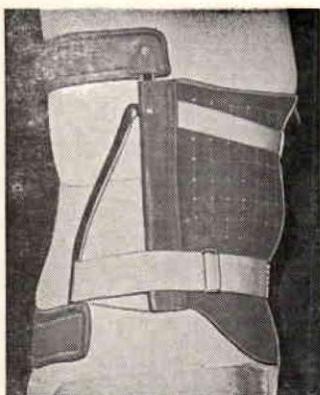


Fig. 2. The Williams Brace, as advertised in *The Journal of Bone & Joint Surgery* and other medical publications. Made by The Miller Brace Company, Dallas, Texas.

Actually the orthodox Williams brace (Fig. 2) uses a long lever arm for brute power, not for arc range to "grind" the lower sacrum forward a few centimeters. Even then it does not go down to the lower sacral level to gain the greatest advantage mechanically of this leverage. As I use it upside down, the lower band starts down at lower sacrum level for this purpose and then curves upward at its ends to leave the greater trochanter free for abduction of hips. Then the lower belt passes forward below the anterosuperior spine and above the substance of the flexed thigh. It is relatively comfortable here. Any pressure sense in this area is countered best by 2 or more surfaces that can slide on each other, not sponge

rubber or the like. A folded handkerchief or a "pancake" powder puff does well, one surface clings to the brace, the other to the body, and a slide occurs between layers. If the powder puff is used only one side of it should be sewn to the brace, and it should be allowed to hang like a bag.

The lower belts in front do not have to be very tight. Their purpose is to control the level that the upper, or navel-level, belts make on the abdomen. The groin pressure problem is lessened at the start, and, with or without compound tincture of benzoin, the patient becomes used to it. For ultimate fit, and for change in body weight, brace size and fit occasioned by use, lacers on the sides with a tongue are practical.

The patient needs training in putting on the brace. *Always* take off 3 belts from leather apron, leaving one on the bottom in place. Then fasten the loose bottom belt in front and check the bottom of the bottom band in rear so that it is at "tail-bone" level. Next, with the *left* thumb and the index fingertips together, cross over in front and push backward on the top end of the *right* (opposite side) loose upright lever arm, and pull that right belt straight laterally from body with the right hand, swing it around forward, maintaining tension against the pulley (a 360° pulley that cannot

really slide well) and, with the now freed left hand, insert belt through buckle and cinch it up tightly. The same procedure is followed on the other side. Have the patient perform the pelvic roll exercise while doing this—maybe with hips (and knees) flexed—and knees against a chair; or it can be done lying in bed. He'll walk away flat backed!

If the top band in rear is too high, the brace can flatten the upper lumbar, expending its force, and leave the lumbosacral area unsatisfied. I think that the top band should cross only at about T-10 level and then curve down slightly so that the top belt lies under the fixed ribs and leaves them free. Considerable side bend of the upper body is permitted, which makes for comfort. Long 11th and 12th ribs can make a "short-waisted" individual and require that the top band be curved down more for this side-rib comfort or come out further toward real sides of the body. It improves the golf score by limiting the back swing to the controllable range.

Lateral roentgenograms without any brace, the patient assuming strong lordosis in both situations, can be superimposed on those taken with the orthodox Williams brace in place. Norton already has proven that, to his knowledge, no brace has had any effect on available lumbar motion.\*

From my own studies, such lateral roentgenograms with the upside-down brace in place showed prevention of the (approximate) lordotic half

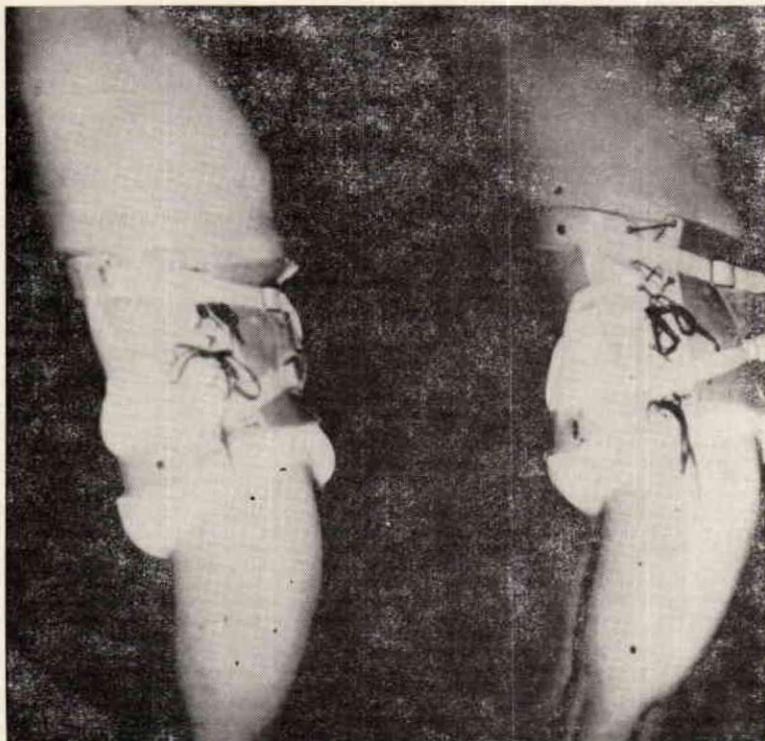


Fig. 3. (R'ght) Williams' application and (lef.) upside down, both with active lordosis.

\* Norton, P. L., and Brown, Thornton: The immobilizing efficiency of back braces, *J. Bone & Joint Surg.* 37-A:635, 1955, and 39-A:111-139, 1957.

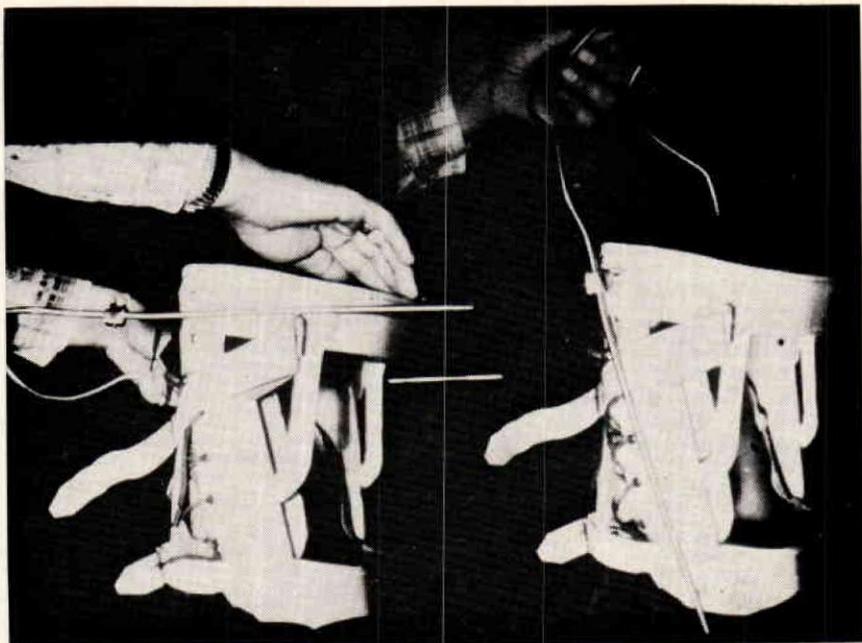


Fig. 4. Flexion low back-extension upper back brace.

of low-back range, or a range from full flat back to about midposition only. I have no volunteers for Norton's pins inserted in spinous processes, with deflection gauges applied. (Fig. 3, *left* [Williams application], compared with Fig. 3, *right* [upside down], both with active effort toward lordosis shows clinical appearance and difference).

In summary, the upside-down flexion back brace more accurately follows changed contours of the lower body as it goes to flat back; it produces arcs of brace motion that correspond to those made by various parts of the back engaging in this change; it utilizes a pivot point to float backward to follow rearward displacement of the lumbosacral area; it does this by even pressure application points that simulate those made actively by the patient in this change of posture. The whole amounts to a clinically comfortable brace, proven by x-ray studies to be more effective. Essentially it "buys" some brace muscles to work immediately while the patient develops by exercises his own active muscle power and particularly the know-how of their use in body control, and helps him to realize more quickly the desired body image. It does not produce as much atrophy as has been a common fear of braces, for any automatic effort made to relieve pressure of the brace is a pelvic roll exercise that unconsciously is done often in the brace. Frequently the patient himself realizes later that he is "better than the brace," and then usually it is reasonably safe to remove it.

In earlier conversation with Paul Williams he stated that he never had used the brace upside down but emphasized that it still was the 3-point principle. With that I heartily agree and even add a fourth: the floating pivot point that is the heart of the dynamic application of anterior force against the lumbosacral level to cause it to move backward.

With a reliable brace to flatten the low lumbar it is a reasonable step to utilize it to accentuate further the exercise program of postural training—

low-back flexion, hold, then upper back extension (Fig. 4). First develop a pivot point near both outer ends of the upper band. Use a rotating padded surface at the upper sternum. A U-shaped 1/4-inch or 5/16-inch round rod, bent just to miss breast and chest from this pad, runs downward to hook onto these pivot points and protrude backward. The lower rod ends now are forced forward to snap over a slightly hooked stud near the lateral ends of the bottom band; or, if the object is simply more elastic postural urge, an elastic strap across the front can be used to pull the lower ends forward—any variability in upper-back extension can be made with the low back held flat. If the pivot point is made like a T, a slotted hole off the extension rod can hook onto it with the upper half of the brace at 90° (horizontal) to the body. Then, when the U-rod and the pad are rotated up to the sternum, this pivot will not jump off accidentally. The late results of a dorsolumbar compression fracture is usually lumbosacral pain, which is created largely by the doctor by his over-all hyperextension brace or cast, plus a vertebra that has just about the same compression on healing that it had on the original roentgenogram. This flexion low back-extension upper back brace is useful in such cases, as well as in adolescent round back and in osteoporosis, for a while at least in those cases with vertebral body compression.

Garters to hold up stockings and hernial pads as a truss can be attached to the brace. One can use the brace instead of a Hessian girdle or other low-torso brace to be attached to lower extremity long-leg braces. I have used it to advantage for 14 years, ever since I was alerted to the arcs and dynamic pivot point by a barrel-bodied farmer who informed me, and demonstrated to me, that he was more comfortable and flattened more effectively by his Williams brace when he wore it upside down.



## Construction and Fitting of the “Upside-Down Brace”

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*EDITOR'S NOTE: Information on the technical aspects of fitting the brace described in the previous article has been contributed by the Messrs. Plattner. This material was not previously included in the article by Dr. Stuttle.*

Our experience with “The Upside-down Flexion Back Brace” dates back to approximately 1950, when after considerable experimental work, we arrived at a standard for measurement and fitting. We feel that it is the most effective brace to hold the patient in a flat back position.

### Procedure

With the patient standing, arms at sides and facing orthotist, take (1) a snug measurement of the hips at the trochanter level. Then (2) a snug