

Opinion

Modern Orthosis Therapy for Scoliosis, Kyphosis and other postural defects

Adrian Tudor, Carolina Diamandis, David Rosenberg

Corresponding Authors

LCG Georgia Medical Research
Dr. David Rosenberg, M.D.
49 Dimitri Uznadze Street Tblisi
State of Georgia
LazarClinicGroup@post.com



Abstract

As a conservative form of treatment for scoliosis and kyphosis (postural deficits), orthotic therapy still represents the gold standard of non-surgical orthopedics. In light of increasingly frequent complications due to dangerous wound infections caused by multi-resistant germs, it is to be expected that the treatment of clinically relevant postural deformities will again be increasingly conservative in the future. Apart from "saving" the patient from wearing an orthosis, surgical (invasive) treatment has not been proven to be superior.

Report

Orthotic treatment is on the rise again. However, many of its experts have long passed away because surgical treatments have dominated this field in the past forty years. However, a successful therapy requires excellent cooperation between the physician, orthotist, and physiotherapist. Only reproducible standard x-rays of the entire spine in a standing position allow a reliable assessment of the actual course of the curvature. The goal of conservative treatment of postural defects is to adapt the form and function of the deformed spine to near-physiological conditions. To this end, corrective forces are applied to the spine from the outside. The direction, strength, duration, frequency, localization and type of these forces vary. Based on the manifold clinical experiences between approx. 1920 and 1980 (hundreds of thousands of patients worldwide), it can be safely assumed that distracting force effects have a better corrective effect on pronounced curvatures of more than 53 degrees than transverse, lateral force effects, but their efficiency is more favorable on smaller scoliosis angles. Conservative scoliosis therapy has taken this into account by developing different types of orthoses whose correction mechanisms follow the possible force applications.^{1,2,3,8,11}

The best known type is an orthosis with distracting, axial force application called Milwaukee orthosis, whose neck-head support gently forces the patient into an active straightening of the curve. Early works described average corrections of 15 to 25 percent for thoracic curves and 10 to 22 percent for lumbar curves. For thoracic scolioses of 20-30 percent and for high thoracic curves 7-18 percent. These are remarkably high values for a completely conservative (nonsurgical) procedure. True treatment failure with orthotic treatment is virtually non-existent. However, undesirably small improvements in posture are associated with an initial angle greater than 30 degrees and a very late start of orthotic treatment. Other characteristics are negatively predictive of prognosis: poor patient compliance (can be solved with plaster orthoses), too short a treatment period, and too little physiotherapy. Orthoses with transverse/transversal force application are summarized under the generic term derotation orthoses. This group does not include the neck and head. From today's point of view, this feature can at best be regarded as a cosmetic advantage. The inclusion of the head should also be standard for these orthoses by now, and if necessary, the usual fixation by means of a forehead strap or stabilization cap can be omitted in some cases. A distinction is made between derotation orthoses made of plastic and orthoses made of plastic and metal. From the heyday of orthotic treatment between 40 and 50 percent are described, today we observe significantly more in the range of 60 to 80 percent.^{1,2,3,4,7,10}

Conservative scoliosis treatment should only be performed by an experienced orthopedic doctor. During corset fitting, monitoring the skin, skin care and learning physiotherapy exercises are of great importance. Before a corset fitting, X-rays of the entire spine must be taken and evaluated in the standing position in two planes using standardized X-ray techniques and, in special cases, additional X-rays. The result of the corset fitting must always be checked in an X-ray of the spinal column in the frontal and sagittal beam path with the corset and radiopaque, marked pads. Immediate consequences must be drawn from any changes in the findings, for example in the form of a brace modification or a review of the brace therapy. Marked pressure pads in the brace allow an exact assessment of the forces applied to the spine in the X-ray image. At intervals of no more than three months, the specialist with corset experience must examine the patient and answer any problem questions that may arise. The fit of the orthosis and the condition of the skin on the trunk must be monitored regularly. Corset-free times for orthotic changes should not massively exceed the usual corset-free time in therapy, which means that corset changes must be made within a few hours on one day.¹⁻¹¹

For problematic issues such as skin redness, pressure points, groin pressure pain while sitting, pressure pain at the thoracic edge and technical deficiencies of the corset, During the time of therapy, the corset should be taken off for skin and body care for only one hour a day, if possible. After the stabilization phase, i.e. after about two to four years, the brace-free time can be extended by 45 minutes a day in favor of school sports or recreational sports. Sports can be done with or without a brace. Even more effective is the performance of regular daily physiotherapeutic exercises. Physiotherapy treatment is not sufficient as a therapy in case of a given corset treatment indication. However, physiotherapy therapy supports the correction in the corset to a considerable extent. As a rule, sustained diligence cannot be expected without the support of a physiotherapist. Orthosis weaning or corset training should be based on the physiological signs of maturity in the spine and the iliac crest near the spine.^{6,8,11}

Considering the stress caused by one or more anesthetics as well as the ever increasing spread of bad and worst hospital infections with all their consequences, the benefit and risk of surgical interventions for postural defects (up to the status of moderate) are no longer in a favorable relation to each other.^{15,16,17,18} Of course, such operations are a popular source of income and numerous colleagues have approached this subject with idealism. Nevertheless, one must not forget for a second that most patients are adolescents, in whom one must be all the more careful to minimize risks. No doubt, wearing an orthosis is uncomfortable at first.^{1,9,11} However, this is also the case with orthodontic braces, and yet they continue to be used, and rightly so, even though there is a certain tendency toward invasive procedures in orthodontics as well. So the only possible psychological reason that remains is why surgery continues to be preferred to orthotics. An orthosis is visible and may cause mixed feelings in the patients. In addition, it is a major change for body movement, at least in the initial phase of treatment, not to be able to move the upper body and head freely. However, there is not a single study on PubMed, Google Scholar or other registries that prove a serious psychological burden of orthoses. Moreover, an orthosis is worn for several years when modern models are used.^{6,11} The often painful quick fix treatments are a thing of the past. After a few months at the latest, most patients are so accustomed to their orthosis that it is hardly perceived as restrictive anymore. Poor compliance is not a problem either, as it is possible to switch from removable orthoses to plaster corsets and plaster beds at any time.^{12,13} Technically this is no different from the usual fixed braces, which have increasingly replaced the removable ones in orthodontics.

In short, anyone who does not treat mild to moderate postural issues with modern orthoses in view of the risks of surgery is doing the patient more harm than good.

Conflicts of interest

None.

References

1. Shakil H, Iqbal ZA, Al-Ghadir AH. Scoliosis: review of types of curves, etiological theories and conservative treatment. *J Back Musculoskelet Rehabil.* 2014;27(2):111-5. doi: 10.3233/BMR-130438. PMID: 24284269.
2. Weinstein SL, Dolan LA, Cheng JC, Danielsson A, Morcuende JA. Adolescent idiopathic scoliosis. *Lancet.* 2008 May 3;371(9623):1527-37. doi: 10.1016/S0140-6736(08)60658-3. PMID: 18456103.
3. Heary RF, Bono CM, Kumar S. Bracing for scoliosis. *Neurosurgery.* 2008 Sep;63(3 Suppl):125-30. doi: 10.1227/01.NEU.0000320387.93907.97. PMID: 18812914.
4. Kavyani M, Nasiri E, Karimi MT, Fatoye F. The effect of spinal bracing on stability in patients with adolescent idiopathic scoliosis. *J Back Musculoskelet Rehabil.* 2020;33(1):139-143. doi: 10.3233/BMR-170908. PMID: 31127752.
5. Gutowski WT, Renshaw TS. Orthotic results in adolescent kyphosis. *Spine (Phila Pa 1976).* 1988 May;13(5):485-9. doi: 10.1097/00007632-198805000-00009. PMID: 3187692.
6. Agabegi SS, Asghar FA, Herkowitz HN. Spinal orthoses. *J Am Acad Orthop Surg.* 2010 Nov;18(11):657-67. doi: 10.5435/00124635-201011000-00003. PMID: 21041800.
7. Bunnell WP. Spinal deformity. *Pediatr Clin North Am.* 1986 Dec;33(6):1475-87. doi: 10.1016/s0031-3955(16)36155-7. PMID: 3786010.
8. Farady JA. Current principles in the nonoperative management of structural adolescent idiopathic scoliosis. *Phys Ther.* 1983 Apr;63(4):512-23. doi: 10.1093/ptj/63.4.512. PMID: 6340130.
9. Gaines RW. Scoliosis and kyphosis, review and current concepts. *Mo Med.* 1980 Mar;77(3):124-34. PMID: 6988690.
10. Vesely DG, Blaylock HI, Harrison J. Scoliosis treatment by spinal fusion, Harrington instrumentation, and Milwaukee brace. *Ala J Med Sci.* 1979 Oct;16(4):370-3. PMID: 546243.
11. Winter RB, Carlson JM. Modern orthotics for spinal deformities. *Clin Orthop Relat Res.* 1977 Jul-Aug;(126):74-86. PMID: 598143.

12. Colombani S, Grandesso F. *Il lettino gessato nella cura delle scoliosi iniziali [Plaster bed in the therapy of early scoliosis]*. *Chir Organi Mov.* 1970;58(5):438-46. Italian. PMID: 5469633.
13. ZSAKAY S. *[A plaster bed with segmental redressements for the treatment of scolioses]*. *Acta Chir Orthop Traumatol Cech.* 1961 Apr;28:147-9. Czech. PMID: 13788828.
14. GEROLD M. *Über den Wert der Behandlung einiger häufig vorkommender Erkrankungen der Wirbelsäule mit Gipsbett und Gipskorsett [Value of treatment of common spinal diseases with plaster bed and plaster jacket]*. *Z Unfallmed Berufskr.* 1956;49(4):270-7. German. PMID: 13410000.
15. Chaberny IF, Sohr D, Rüden H, Gastmeier P. *Development of a surveillance system for methicillin-resistant Staphylococcus aureus in German hospitals*. *Infect Control Hosp Epidemiol.* 2007 Apr;28(4):446-52. doi: 10.1086/513444. Epub 2007 Mar 15. PMID: 17385151.
16. Kaku M. *[Controlling hospital infections and the cost effectiveness]*. *Nihon Naika Gakkai Zasshi.* 2006 Sep 10;95(9):1946-50. Japanese. doi: 10.2169/naika.95.1946. PMID: 17037340.
17. Ustünsöz B. *Hospital infections in radiology clinics*. *Diagn Interv Radiol.* 2005 Mar;11(1):5-9. PMID: 15795835.
18. Shagam JY. *The radiology department and nosocomial infections*. *Radiol Technol.* 1999 May-Jun;70(5):418-30; quiz 431-3. PMID: 10427587.



LCG Research is actively supporting science made in Georgia.