Relative efficacy of symmetrical, semi-symmetrical and asymmetrical scoliosis braces for cobb angle and 3d correction of idiopathic scoliosis

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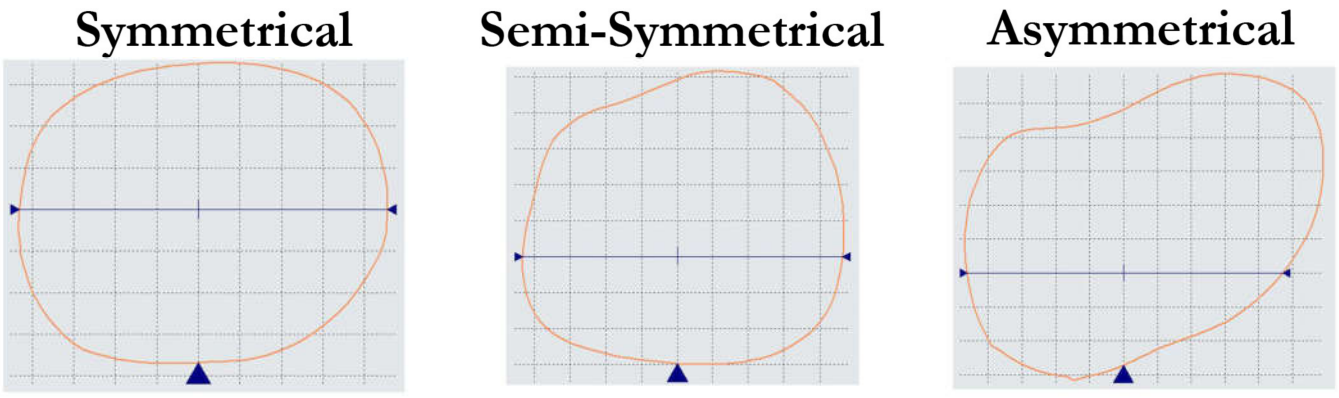
Introduction: Scoliosis brace designs have been variously described by orthotists, patients, parents, and other medical professionals in terms of their relative symmetry, and potential for addressing 3D abnormalities, yet without a common understanding of the precise implications of these on specific shape and design characteristics. Objective: To describe the inherent trade-offs of so-called symmetrical, semi-symmetrical and asymmetrical scoliosis brace types in terms of their relative efficacy in improving the major Cobb angle versus 3D aspects of a patient's scoliosis, as well as the respective challenges posed regarding brace modification, fitting, and follow-up as well as orthotists' skills.

Methods: The shapes of different handmade and CAD-modified brace types for the same curve pattern were studied in CAD software as well as in brace clinical photos. The characteristics and effects of each brace type are explained and presented.

Results and discussion: We found that symmetrical brace designs were less complex designs that required minimal time, effort and clinician's skills to modify, fit and adjust on follow-up. They focus on Cobb angle correction in the frontal plane, while neglecting the 3D aspects of scoliosis.

By comparison, the semi-symmetrical designs were a bit more complex, required slightly more time and effort for modification, fitting and follow-up, and achieved slightly more 3D correction. The asymmetrical designs were the most complex of the three, with pressure and expansion areas that required the greatest amount of time for modification, fitting and follow-up, as well as clinician's skills. They also had the highest potential for adequate 3D correction of the torso and the spine, but the greatest risk for mistakes due to their complexity.

Conclusions and significance: Scoliosis brace designs have the capability of addressing both the principal Cobb angle as well as 3D abnormalities, but with important differences in their relative efficacy on these two aspects and on ease of use and modification. Increased awareness of these inherent trade-offs should help both orthotists and their patients ensure that they choose a brace design that properly weighs their concerns for 3D and Cobb angle correction, as well as their other priorities.



Transverse view at the thoracic section of a right thoracic curve for symmetrical, semi-symmetrical and asymmetrical brace designs.