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Retrospective Study

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Early predictor of orthotic intervention effectiveness: a retrospective analysis

Abstract

A successful treatment with a scoliosis orthosis accomplishes a change of a spinal alignment that cannot be visually assessed during the fitting appointment. The need to return to unexpected follow-up for device modifications can negatively impact the relationship between the treating orthotist and the patient, as well as the one between the treating orthotist and the referring physician. A change of axial height has been proposed as a predictor of orthotic intervention effectiveness. Our study aims to replicate the results and to refine the clinical process toward the goal of reducing the need for the patient to return to unexpected follow ups. The study cohort consisted of 20 participants receiving routine conservative scoliosis treatment and was limited to day-time wearers to eliminate over-corrective interventions' contribution to the data. Height changes over time are already collected in our practice to support intervention replacement due to growth and the change of pre-and post- interventions heights were screened and correlated to the radiological findings. The proposed utilization of height change following intervention initiation was replicated and supported.

Keywords: orthotic intervention, scoliosis, spinal alignment, axial height

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Theoretical orientation

This study was approached from the Biopsychosocial theory perspective.

Introduction

With some variation for divergent intervention designs/approaches, a scoliosis TLSO/LSO is considered successful when a minimum of 50% of curve magnitude is corrected by the intervention.[1] A total contact fit that can be assessed visually can produce insufficient in-intervention correction on radiological verification, with subsequent radiation exposure, time/travel demands, costs, and potentially negatively impacting the clinical alignment between the patient and the orthotist[2] and/or the professional relationship between the referring physician and the orthotist. A promising pathway to predict intervention effectiveness was proposed and reported by Courtney et al.,[3] and was complicated by the prevalence of over-corrective/hyper corrective interventions and open to inter-rater reliability limitations. The goals of our investigation were to replicate the findings and refine the protocol to offer the best possible clinical guidance.

Patients

The investigational cohort consisted of 20 Adolescent Idiopathic Scoliosis cases: 17 females, 3 males; 13 double and 7 single scoliotic curves treated with either a daytime or a full-time scoliosis TLSO of varying designs, as was appropriate for each individual case. 2 of the patients were undergoing diagnostic work up and the scoliosis curves may be re-classified as syndrome, while congenital, neuromuscular, and degenerative scoliosis cases were excluded from the analysis. All of the participants were ambulatory and communicative, with manual dexterity to independently don/doff the orthotic intervention. With the patient height not a mandatory data point for orthotic treatment, consequence-free opt-out was permitted in observance of patient's self-determination.

Methods

The data collected as part of routine care was retrospectively analyzed by a member of the clinical team other than the one providing care to mitigate a potential for personal bias. The participants were asked to have their height measured before and after the intervention fitting utilizing a Seca wall-mounted stadiometer and the height changes were tracked in follow-up. The height changes seen were correlated to the radiographic findings of either sufficient or lacking in-orthosis correction.

Results

6 of the participants declined having their height measured, with 4 maintaining the resistance through the follow-up.

All 20 patients achieved 50% or greater in-orthosis correction on radiological findings.

Only 2 of the cases meeting appropriate correction on radiology did not increase in their height.

2 of the participants did not exhibit a height change initially, but it was seen at first follow up when the time elapsed was insufficient to achieve axial growth and no growth spurt seen in continued follow up.

Discussion

A change in axial height appears as an appropriate predictor of the impact of the orthosis on the spinal alignment. An increase of height after an orthotic fitting is strongly suggestive of curve correction. A decrease implies over-correction in that a sagittal plane postural change that can produce a height decrease would be detectable on a visual evaluation in a clinical setting. No change warrants further evaluation and possible orthosis modification. Caution appears warranted in that postural habits may mitigate the impact of the orthosis during the initial fitting and an appropriate correction may become more evident with wean-in time. It seems

also important to recognize that kyphoscoliosis was not represented in the investigational cohort, while kyphosis correction may produce a height change without adequately addressing the scoliosis curve(s) also present. This check-out/verification may not be appropriate for nocturnal and over-corrective intervention strategies.

Conclusion

A change of axial height is an imperfect, but appropriate and useful predictor of orthotic intervention effectiveness. Tracking in- and out- of orthosis axial height is expected to reduce the incidence of insufficient in-orthosis correction that can be seen on initial radiography.

Recommendations for best practice

Orthotists are advised to obtain pre- and post-intervention height of patients undergoing diurnal or full-time scoliosis interventions.

Physicians are encouraged to request pre- and post-intervention heights of orthotic intervention patients before advancing to radiology.

Future research advocacy

It may be possible to correlate the magnitude of the axial height change to the Cobb angle correction achieved by the intervention with a greater number of participants, further standardization by curve type, geometry, or curve rigidity.

Acknowledgements

None.

Conflicts of interest

The authors declare that there are no conflicts of interest.

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