Abstract

Can an immediate increase of standing height, when wearing a corrective scoliosis brace, be predictive of in-brace skeletal correction?

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Introduction

A relationship between spinal distraction and correction of a scoliotic curvature is long recognised. Literature confirms height is lost secondary to scoliosis and that height can be gained following fusion surgery. 5 published mathematical algorithms predict expected height loss secondary to a patient's scoliosis. These are largely based on initial presenting Cobb angle(s). There is a paucity of literature reverse engineering this information to predict how much height should be gained in-brace at a fitting appointment if a brace is successfully correcting the scoliosis.

In-brace (Cobb angle) correction is a primary indicator in predicting final success of scoliotic brace treatment and is a primary focus in conservative treatment. Whilst experienced orthotists can predict a brace's efficacy by clinical observation, there are no measurable/quantifiable tools in clinic to confirm the brace is optimum before the in-brace x-ray. This ensures that the radiation exposure is only used for assessing an optimum correction of the spine.

Aims

The first aim is to establish if measured height change, during the fitting appointment, is consistent with expected height loss predicted in current literature. Following this, the study aims to look at correlation between height gain and radiological improvements when wearing a corrective scoliosis brace. We will then aim to consider the suitability of measuring height gain at fitting as a quantifiable clinical tool in determining brace efficacy prior to exposing the subject to radiation.

Patients and Methods

Data collection was from January 2022. Each patient (n=60) had two standing height measurements taken on the same day – one pre and one post fitting (with the brace in situ). We measured two Cobb angles, one baseline and one in-brace. The relationship between these measures were evaluated. Statistical analysis was performed.

Abstract

Results

The mean age was 12.4 years. Mean Risser 1.49. Mean Cobb at assessment was 38.1°, correcting to 10.1° in-brace. Mean in-brace correction 74.96%. Mean height change at fitting was 1.1cm (range -0.2cm to 3.5cm). Patients who achieved in-brace Cobb angles closest to null had the most significant

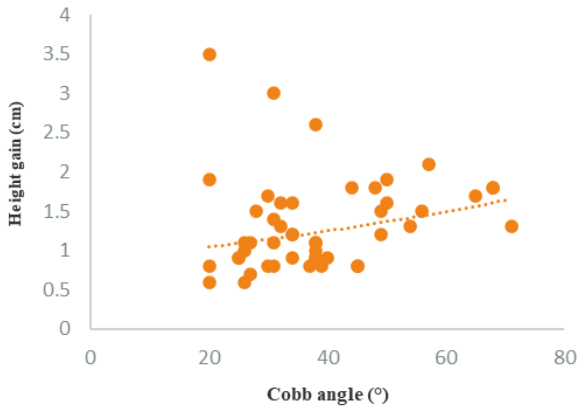

Fig. 3. LOC data linking cobb angle and height gain in brace.

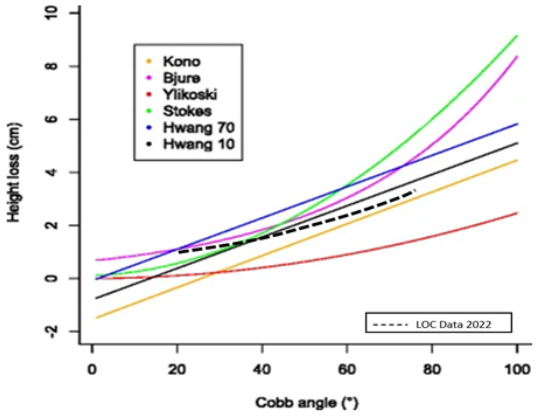

Fig. 4. Adjusted graphical formulae for calculating height loss.

increase in height.

When we remove patients who had correction exceeding 100% in-brace (those who exceed maximal spinal distraction), our linear trendline shows height change at fitting is consistent with the current literature. Our R value shows moderate positive correlation between initial presenting cobb angle and height change (0.4791). Our P-value is 0.0027 ($p<0.05$). Results show all patients who had a height gain above our linear trendline demonstrated a mean correction of 78.1% (range 60-180%).

Conclusion

Assessing novel methods of confirming not only adequate but optimal brace wear is essential. Limiting radiation is a priority in children. We found a positive correlation between original Cobb angle and in-brace height change.

We also found that patients who had a height change above the trendline demonstrated above expected in-brace skeletal correction (international standards of 50%). We conclude that measuring height change at fitting can be used to predict brace efficacy and optimise scoliotic correction prior to the initial in-brace x-ray.