

Cheneau Bracing is Effective in Older Patients with Larger Curves - Results of Retrospective Chart Analysis

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Introduction: In North America, bracing is a standard of care for growing adolescents with idiopathic scoliosis (AIS) and curves 20°-40°. Cheneau type braces are designed to achieve the best possible correction in all 3 planes as compared to most commonly used TLSO type with a tubular design that are most commonly used. Research suggests that TLSO bracing prevents scoliosis curves progression to the threshold for surgery defined as 50°. Conversely, the evidence of the effectiveness of Cheneau type brace is lacking.

Moreover, skepticism around bracing patients who are close to the end of growing (i.e. Risser >3) and with larger curves exists.

Objective: To determine the effect of at least 1-year intervention with Cheneau brace on the Cobb angle change in patients with AIS considering their baseline maturity level as defined by Risser.

Methods: This is a preliminary retrospective chart analysis of a cohort of 38 adolescents with AIS recruited in a single centre from March 2013 to November 2018. The cohort included patients aged 10 to 16, Risser score 0 to 4 and curves between 20° and 60°. The primary outcome was change in the Largest Curve, and secondary outcomes were change in the Thoracic and Lumbar Curves. The treatment consisted of an evaluation and 3D scanning of patients using Rodin Neo Software followed by a computer-aided design/computer-aided manufacturing

(CAD/CAM) 3D modelling of a brace positive, and production of a hand-modified hyper-corrected mold. Each brace was custom fitted, and the in-brace correction was checked. Patients were followed-up between 12 and 15 months. Out-of-brace radiographs were taken at baseline, and follow-up with a patient being out of a brace for at least 24 hours. The patients were instructed to wear a brace full time (23h/day). The repeated measures ANCOVA was used to determine the effect of the treatment on change in primary and secondary outcomes using baseline Risser score as a covariate. We used Tukey adjustment for post hoc comparisons.

Results and Discussion: The mean age, Risser score, Largest Curve, Thoracic Curve and Lumbar Curve were 12.3±1.4, 0.8±1.2, 35.1°±10.1°, 31.9°±12.7° and 23.9°±13.2°, respectively. Of 38 patients, 32 were girls. The mean follow-up was 13.5 months. On average, the Largest Curve and Thoracic curve improved by 5.58° (SE=1.78°, p=0.005) and 4.94° (SE=1.94°, p=0.017), respectively. Lumbar curve also improved by 4.5° but did not reach statistical significance (SE=2.79°, p=0.119). Risser sign was predictive of success, such that adolescents with Risser 4 had a largest improvement of on average 8.0° (SE=8.98°), 12.0° (SE=9.95°) and 9.0° (SE=11.1°) for Largest, Thoracic and Lumbar Curves, respectively. Patients with Risser 4 had largest curves at the initiation of the treatment, with Largest, Thoracic and Lumbar Curves measuring 52.3° (SE=8.93°), 51.4° (SE=9.95°) and 41.0° (SE=11.1°), respectively.

Conclusion and Significance: The main goal of the brace treatment is to stop the curves from progression. In this study, we found that Cheneau braces improved the Largest, Thoracic and Lumbar curves over a mean follow up of 13.5 months in patients with AIS. Moreover, we found that older patients also benefitted from the treatment despite starting with curves beyond the threshold for bracing, suggesting that bracing could be effective even when curves are larger than suggested 40°. Long-term effect of the 3D Cheneau type brace concept is urgently needed.

