CASE REPORT

Results of chiropractic scoliosis rehabilitation treatment at two years post-skeletal maturity in identical female twins

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Summary

Background: Scoliosis treatment guidelines for non-operative management suggest that patients should be followed for two years beyond skeletal maturity to appropriately evaluate treatment effect. This report outlines the results of identical twin girls’ treatment with chiropractic rehabilitation treatment at two years post skeletal maturity.

Findings: The twins participated in a treatment lasting two weeks, followed by home care maintenance and periodic follow-ups for they reached skeletal maturity. Two year follow up showed reduced Cobb angles of 19\degree and 15\degree, respectively.

Conclusion: Identical twin girls who were evaluated two years after skeletal maturity showed clinically significant improvements in Cobb angle measurements. Controlled, prospective study design for future patients treated in this manner will provide greater insight into how the treatment may have impacted the observed changes.

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Introduction

Adolescent idiopathic scoliosis occurs in approximately 2–3\% of the population (Negrini et al., 2012). The conventional treatment pathway for adolescent idiopathic scoliosis involves observation for curves below 20\degree, bracing for curves from 20 to 40\degree, and surgery above 40\degree–45\degree.
(Negrini et al., 2011). However, these values can vary widely (Dolan and Weinstein, 2007). Although bracing and surgery have remained the gold standard of treatment in the US, newer research is questioning the safety and effectiveness of their routine use (Weiss and Goodall, 2008). This has created a bigger focus on exercise methods for scoliosis (Weiss et al., 2006).

While earlier reviews have shown that manual therapy methods for scoliosis treatment, including chiropractic, were lacking (Romano and Negrini, 2008), more recent research is being published regarding the chiropractic treatment of scoliosis. Some of these studies evaluate manipulation-only as a treatment (Chen and Chiu, 2008; Tarola, 1994), others have reported results with manipulation plus bracing (Rowe et al., 2006), manipulation under anesthesia (Morningstar and Strauchman, 2010), manipulation plus postural education and heel lifts (Lantz and Chen, 2001), manipulation plus electric stimulation (Aspegren and Cox, 1987), and manipulation plus exercises for adult patients (Morningstar, 2011a,b; Blum, 2002). Weiss previously recommended that any non-surgical management strategy for adolescent idiopathic scoliosis should be conducted through two years post-skeletal maturity to evaluate treatment results (Weiss, 2012). Only one study to date has evaluated the ability of a chiropractic treatment to positively affect scoliosis over the course of adolescent growth through skeletal maturity (Morningstar, 2011a,b). More studies are needed to identify chiropractic’s role in scoliosis management. This study reports the results of identical female twins who both had adolescent idiopathic scoliosis and were treated using a conservative chiropractic rehabilitation treatment. Both patients gave their written informed consent to have their data and demonstration photos published.

Case report

In 2009, at age 13, the twins were diagnosed with idiopathic scoliosis during a routine physical by their pediatrician. Both girls were negative for any comorbid conditions, and had no significant history of chronic disease. Both girls were well nourished, energetic, and pleasant adolescent females who happen to be diagnosed with idiopathic scoliosis. Both girls did list occasional back pain as a complaint and one also listed occasional shortness of breath. No treatment was recommended at that time other than a future annual visit. Follow-up routine visit with their pediatrician demonstrated significant progression visually which resulted in a radiographic assessment. This was evaluated by an orthopedic specialist who then recommended a rigid spinal orthosis for one twin (Patient B), which was not obtained, while fusion surgery was tentatively scheduled for December 2010 for the other (Patient A). Both girls were considered highly progressive. Both girls began menstruation at 13 years, 4 months.

Both girls were evaluated by the lead author (BD) on 05/10/2010 prior to engaging in an intensive chiropractic scoliosis program and home therapy. Standard spinal exam procedures demonstrated normal physiological ranges of motion both passively and actively. No functional deficits were observed in spinal ranges of motion, balance testing, hip and sacroiliac ranges of motion, or abdominal strength testing. Radiographic study at this time revealed a thoracolumbar dextroscoliosis of 47° from T7-L2 with a T10/T11 apex (Patient A), and a thoracolumbar levoscoliosis of 37° from T11-L4 with an apex of L1 (Patient B). These radiographs are shown in Figure 1. Based upon this assessment, the parents and patients decided to proceed with a conservative chiropractic rehabilitation treatment.

Intervention and outcome

Given the degree of scoliosis, and its history of progression, a course of intensive short term chiropractic rehabilitation was initiated. This treatment included multiple daily office visits (three per day) for a total of 10 days (5 days per week for two consecutive weeks). During each office visit, the patient received motorized flexion distraction (shown in Figure 1).
Fig. 2) using specialized scoliosis brackets that help to mobilize the apex of the scoliosis for 20 min. Patient then received motorized cervical extension traction for about seven minutes using five pounds of resistance weight while also lying on pelvic blocks (see Fig. 3). After these warm-up procedures were performed, chiropractic manipulation was administered using manual, instrument-assisted, and drop table techniques according to the chiropractic exam each day. Patients then sat in a scoliosis traction chair for 30 min while lateral strapping attempted to de-rotate and laterally reduce the scoliosis. This was done while the patient performed lumbar mobilization exercises on an inflatable therapy disc, which is illustrated in Fig. 4. Finally, the patients performed proprioceptive balancing while wearing a scoliosis cantilever with four pounds of resistance and a lateral hipweight with 12 pounds while balancing on a 24-inch vestibular disc sitting on a vibration platform set at 30Hz. This was performed for 20 min. This setup is shown in Fig. 5. This procedure has been the subject of previous study in adolescent idiopathic scoliosis (Dovorany and Morningstar, 2013).

Following the first 10 days of treatment, the Cobb angles measured 19° (Patient A) and 16° (Patient B). The patients were sent home with specific exercise instructions. Their routines included 30 min a day in the scoliosis traction chair, followed by 20 min of proprioceptive balancing on the 24-inch disc with scoliosis cantilever and hipweight. The scoliosis traction chair has also been previously studied in adolescent patients (Woggon and Martinez, 2013). These procedures were repeated three times daily for 24 months. At that time, the scoliosis traction chair was discontinued while the proprioceptive balancing was continued. Periodic follow-up visits occurred every three months from May 2010 through December 2012. Cobb angles measurements were maintained at this interval. Follow-ups then decreased to every six months.

Daily use of the home exercise equipment was discontinued in July of 2013 after the lead author determined that both girls had reached a Risser 5 and had showed consistent, stable postural assessments. Since curves of approximately 30° at skeletal maturity still have a significant risk for progression throughout adulthood (Marty-Poumarat et al., 2007) the lead author felt it important to maintain home care for two years following skeletal maturity. The twins were re-examined in January of 2014, without having performed any treatment or home care for the previous six months. Radiographic images obtained during this follow-up appointment showed that Patient B’s
scoliosis had been corrected to 26°, while Patient A’s scoliosis measured 22°. Fig. 6 shows these radiographic studies and corresponding postural grid photography. This represents a curve deterioration of 7° and 6°, respectively, compared to the post 2-week treatment trial.

Discussion

This is the first study on chiropractic rehabilitation treatment for scoliosis to report the results of identical twins from the initiation of exercise-based treatment through at least two years post skeletal maturity, as recommended by both the Scoliosis Research Society (Richards et al., 2005) and Weiss (2012) for non-operative therapies. This study does provide evidence that non-bracing, scoliosis-specific exercise treatments may have beneficial impacts on skeletally immature patients affected with scoliosis. The treatment outlined for these two patients was multimodal in nature. Both patients had received the biggest corrections immediately following the 2-week treatment. These corrections were essentially maintained throughout the duration of the active treatment process (until the end of December 2012). Although curve deterioration occurred during the follow-up phase, the resultant changes were still clinically significant. This is an important point to emphasize, since juvenile and early adolescent patients need to be monitored more carefully, and perhaps more frequently, in the active phase of treatment.

The initial treatment design (the two-week initial period) is specifically designed so that patients traveling from a distance can complete this therapy in a relatively short period of time, while simultaneously providing extensive home care instruction so that the patients can continue afterward on their own with infrequent follow-up. In our experience, this treatment design seems to be

Figure 5  Illustration of girls wearing their cantilever device with hipweights on vestibular disc.

Figure 6  (A) —Thoracic Cobb angle 26° T7-L2 (B) —Thoracolumbar Cobb angle 22° T11-L4.

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preferred by patients over more traditional therapy pathways that require more frequent and prolonged in-clinic treatment programs. Given the intense extracurricular schedule many American adolescents maintain, this program is a more likely fit.

Limitations

Since this study design was observational, and retrospective, there is no way to determine which applied modalities provided the biggest impact on these patient’s curves. The curve pattern presenting in both of these patients was a thoracolumbar curve pattern. In previous studies using chiropractic rehabilitation techniques, this pattern showed the greatest response to scoliosis-specific exercise treatment (Morningstar, 2011a,b). Because both girls had a thoracolumbar curve pattern, the results in this study are only applicable to this type of curve pattern specifically. No extrapolations can be made about other curve patterns, such as thoracic, lumbar, or double major. The patients in this study will continue to be followed to acquire more longitudinal data. Selection bias is also inherent in any retrospective design. However, the objective here was multifactorial. First, we felt it important to show how identical twins could have opposing curve patterns. Second, that they responded initially to chiropractic rehabilitation, and third, that they avoided bracing and surgery as the only other recommended treatment options.

Conclusion

Two years after skeletal maturity, and six months after chiropractic rehabilitation treatment, a pair of identical twin females had a correction of their thoracolumbar scoliosis by 21° and 15°, respectively. Without a control group, it is unknown how the specific procedures employed contributed to the observed improvement in their respective scoliosis. The multimodal nature of their treatment also precludes our ability to determine which modalities provided the biggest impact. Future outcomes-based research on chiropractic rehabilitation of scoliosis should follow the currently recommended guidelines for non-operative treatment, such as those set forth by the Scoliosis Research Society.

Competing interests

The authors state that they have no conflicts of interest in the publication of this manuscript.

References


