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Resolution of Amenorrhea and Chronic Constipation in an Adult Patient with Idiopathic Scoliosis Wearing a Scoliosis Activity Suit for 6 Months: A Case Report

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Abstract

Objective: To report the symptomatic and radiographic changes in an adult scoliosis patient with a history of amenorrhea and chronic constipation. **Clinical Features:** Patient presented for treatment with an 8-year history of amenorrhea and chronic constipation. Radiographic study showed a right thoracic/left lumbar double major scoliosis. **Intervention and Outcome:** Patient was fitted for a scoliosis activity suit and given instructions for continued home use, building up to 3 - 4 hours total daily. After 6 months of use, her amenorrhea and chronic constipation had resolved, and both scoliosis Cobb angles also improved. Scores on before and after SRS-22r questionnaires, as well as a quadruple numerical pain rating scale, also improved. **Conclusion:** A patient wearing a scoliosis activity suit for 6 months reported symptomatic changes as well as radiographic, pain, and quality of life improvements. The results of this case cannot be generalized. More investigation into the association of scoliosis and other organic symptoms is warranted.

Keywords

Amenorrhea, Chiropractic, Scoliosis, Spine, Rehabilitation

1. Introduction

Adolescent Idiopathic scoliosis affects approximately 3% of the population annually [1]. Many of these adolescents see their curves progress over the lifespan [2], predisposing them to a higher chance of developing chronic pain when compared with age-matched controls [3]. Aside from the incidence of chronic pain, idiopathic scoliosis patients tend to show various hormonal [4], neurological

[5], and bone density abnormalities [6] not seen in age-matched non-scoliotics. Although the cause of idiopathic scoliosis is unknown, many overlapping neuro-hormonal etiopathophysiological constructs have been proposed [4].

Secondary amenorrhea is the cessation of regular menses for three months, or the cessation of irregular menses for six months. Most cases of secondary amenorrhea can be attributed to polycystic ovary syndrome, hypothalamic amenorrhea, hyperprolactinemia, or primary ovarian insufficiency [7]. The occurrence of secondary amenorrhea in patients with idiopathic scoliosis has been previously reported. Warren *et al.* [8] studied a group of young ballet dancers with scoliosis. They found that 44% of the dancers who had scoliosis also had secondary amenorrhea. Among the dancers they studied who had hormone testing performed, the amenorrheic intervals were associated with low estrogen.

Constipation in children older than 4 years is classified as having at least two of following six symptoms: 1) two or fewer defecations in the toilet per week; 2) at least one episode of fecal incontinence per week; 3) history of retentive posturing/stool retention; 4) history of painful or hard stools; 5) a large fecal mass in the rectum; or 6) large diameter stools that can obstruct the toilet. Symptoms must be present once a week or more for at least 1 month [9]. An association between constipation and idiopathic scoliosis has not been reported in the literature. However, previous studies have shown that spinal cord stimulation has produced improved bowel habits in patients with irritable bowel syndrome and abdominal pain [10] [11]. These data seem to support the theory that alterations in spinal cord strain, such as those seen in scoliosis, may result in downstream neurological abnormalities [12] [13].

The incidence of idiopathic scoliosis seems to increase throughout the lifespan, ranging from 1% - 5% in adolescence [14], 8% in young adults [15], up to 68% postmenopausal females age 60 and older [16]. Due to this rising occurrence in adult patients, investigation into scoliosis treatment for adults has been increasing [17]. Previous studies have reported pain and radiographic outcomes in patients wearing a scoliosis activity suit for various lengths of time [18] [19] [20]. The scoliosis activity suit is believed to cause a rotational stimulus which places a slow stretch on deep spinal muscles into the direction of scoliosis rotation, thus eliciting a corrective reflex that causes the same muscles to activate and result in counter-rotation of the spine out of the scoliosis pattern. These rotational adaptations are measurable via visual posture analysis as well as comparative radiography. The activity suit is a neoprene wrap-style exercise suit. It is composed of 4 separate pieces: a thigh piece, a lumbar wrap, a torso vest, and a pair of tension straps that connect the first 3 pieces together based upon the patient's curve pattern [19]. The tension straps are what provide the majority of rotational force as the patient is ambulating. The pieces are configured based up on the patient's curve pattern, and the tension straps are applied relative to each patient's ability to react against the tension straps [20].

Although many patients wearing the suit demonstrated positive pain and radiographic outcomes, none of these previous studies have reported outcomes

in any comorbid conditions. The purpose of this case study is to report the pain, radiographic, quality of life, hormonal, and digestive outcomes in an adult patient with a history of idiopathic scoliosis who wore a scoliosis activity suit for 6 months.

2. Case Report

2.1. Past Medical History

A 24-year-old Caucasian female patient presented to a multidisciplinary medical center with a history of adolescent idiopathic scoliosis. She was first diagnosed at age 11, and prescribed a Charleston nighttime bending brace. The brace kept the curve stable until she reached skeletal maturity. During the course of her brace treatment, she was also diagnosed with amenorrhea. She did not have her first menstrual cycle until age 16. Since that age, she has only had 1 or 2 cycles per year for the subsequent 8 years. She also reported a history of abnormal bowel habits, having only 1 bowel movement every 1 - 2 weeks. She had a positive familial history of idiopathic scoliosis (her brother). Her chief complaints at presentation were low back pain, right shoulder blade pain, and bilateral knee pain. The low back pain and knee pain were described as achy pain, and paresthesia with light touch over the right rhomboid and infraspinatus.

2.2. Baseline Outcome Measures

She rated her pain as a 47/100 on a quadruple numerical pain rating scale (QNPRS). She reported a baseline mean total score on the Scoliosis Research Society -22 revised questionnaire (SRS-22r) of 3.0. Her baseline mean scores for the Appearance, Activity, Pain, and Mental Health subdomains were 3.2, 3.8, 3.2, and 2.4, respectively. Baseline radiographic examination showed a thoracic dextroscoliosis measuring about 27˚ from T6-T12 with a T9 apex, as well as a lumbar levoscoliosis from T12-L4 of about 23˚ with an L2 apex. Patient gave her written informed consent to have her non-identifying data reported.

3. Intervention and Outcome

The patient participated in a scoliosis activity suit (SAS) fitting process, where the focus was on teaching her how to properly put on and adjust her scoliosis activity suit based on her scoliosis curve pattern. She was also given instruction on which specific activities of daily living to perform while wearing the activity suit.

Figure 1 depicts an illustration of the specific scoliosis activity suit configuration worn by this patient. Once the patient was fully instructed and confident in putting on the scoliosis activity suit repeatedly, she was discharged with home wear time instructions. The first month, the patient was recommended to wear the SAS for two 30-minute sessions per day, spread apart by at least two hours. Each subsequent month, the wear time was increased by 15 minutes per session, up to a maximum of 2 - 3 hours per session daily. She was instructed to perform as many of her normal daily activities in the SAS as possible. Lying down was

not allowed to be counted toward the total wear time. After 6 months, the patient reported back to the clinic for follow-up radiographic study. Figure 2 illustrates the changes in her radiographic studies before and after wearing the scoliosis activity suit for 6 months. Her thoracic scoliosis improved to 16˚, while her lumbar scoliosis reduced to 13 degrees. Her quadruple numerical pain rating scale at 6 months was 17/100. Figure 3 shows the changes in her QNPRS before and 6 months. The patient also completed a follow-up SRS-22r at her 6-month follow-up. Her total score, as well as all of the individual subcategories, achieved an improvement of at least 0.6. According to Crawford *et al.* [21], the minimum interval change to be considered a clinically meaningful response is 0.4 in the total score, the Activity score, the Pain score, and the Appearance score. The minimum change in the Mental health score is 0.42 [22]. These scores are illustrated in Figure 4. At her 6-month follow-up the patient reported that in the previous 6 months, she had 5 regular menstrual cycles, compared to 1 - 2 per year over the previous 8 years. She had also begun having regular bowel movements, 1 - 2 times daily, compared to once every 1 or 2 weeks prior to the intervention. The patient was instructed to continue wearing the scoliosis activity suit; and was recommended to continue follow-ups in subsequent 6-month intervals.

Figure 1. This is a right leg SAS setup for a double major right thoracic scoliosis.

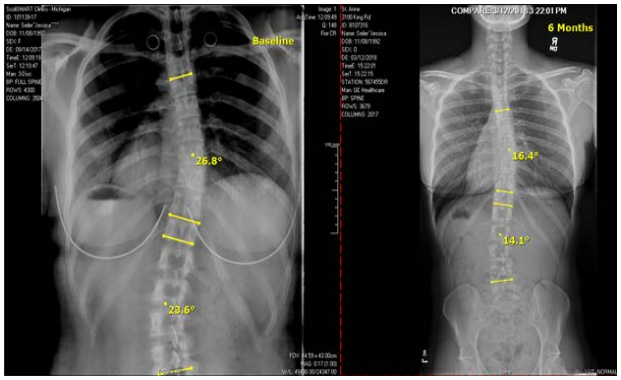

Figure 2. The before (left) and after (right) radiographs taken 6 months after wearing the scoliosis activity suit.

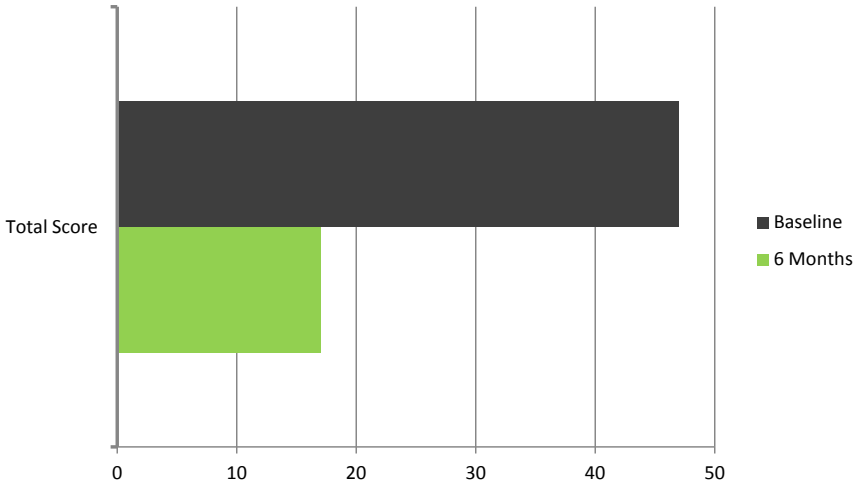

Figure 3. Quadruple numerical pain rating scale scores. The maximum score on a QNPRS is 100. The threshold for high intensity pain is considered 50/100.

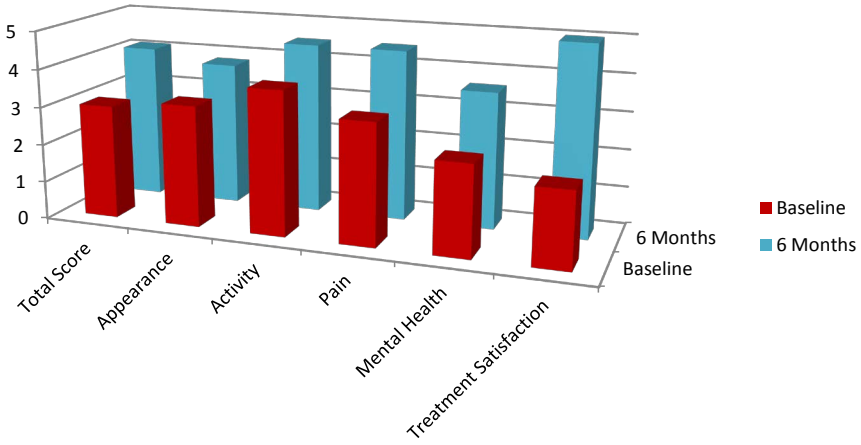

Figure 4. SRS-22r mean scores. Score changes in all categories reached the minimum clinically important benefit threshold of 0.4.

4. Discussion

Aside from radiographic parameters of improvement, such as Cobb's angle, it is being increasingly recognized that conservative treatments should also report other health parameters [23]. These may include pain, cosmetic appearance, and quality of life. To this end, several outcome questionnaires have been created to quantify and report these outcomes. Examples include the SRS-22r [24], the SRS-7 [25], the Patient Generated Index [26], the Italian Spine Youth Quality of Life (ISYQOL) [27], and the Charlson Comorbidity Index (CCMI) [28].

Back pain and related disability is the primary reason an adult patient with a history of idiopathic scoliosis presents for treatment [29]. This may be due to the fact that curve progression continues into adulthood [2], and may directly contribute to the level of back or neck pain related disability experienced by this patient population [30]. Therefore, strategies to aid this patient population throughout their lifespan need to be further developed and explored.

This appears to be the first case in the literature reporting a resolution of amenorrhea and chronic constipation by wearing an exercise suit developed specifically for scoliosis. Historically, these symptoms are managed with various types of pharmacotherapy and lifestyle interventions [31] [32], and not biomechanical or structural therapies. To date, there have been no other reports associating these two organic symptoms with idiopathic scoliosis, no have any reports documented their resolution in response to any conservative scoliosis therapy. The improvements reported by the patient in this case warrant further investigation into their possible connection. It may be that some of the hormonal imbalances thought to exist in idiopathic scoliosis may be contributing to these symptoms concurrently [4], or that changing/minimizing spinal cord stresses may improve downstream neurological responses. However, this needs to be tested before any conclusions can be drawn. Given that this was only a single case study, the results cannot be broadly applied.

5. Conclusion

A patient with an 8-year history of amenorrhea and chronic constipation reported a complete resolution of these symptoms after wearing a scoliosis activity suit for 6 months. It is unknown if or how the improvement in clinical symptoms may be related to changes in her degree of idiopathic scoliosis or to wearing the scoliosis activity suit. The results of this particular case should not be generalized. Follow-up studies investigating these symptoms in patients with idiopathic scoliosis are recommended.

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