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CASE REPORT

Lumbar scoliosis: Reducing lower back pain and improving function in adulthood. A case report with a 2-year follow-up

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Summary *Background:* Lower back pain (LBP) can persist into adulthood as a sequelae of adolescent lumbar scoliosis, particularly under certain conditions influenced by aspects of bodily biomechanics and/or other factors. Here we describe the use of tailored bracing used in an adult with pre-existing lumbar scoliosis suffering from LBP.
Case description: A 40-year-old female presented with acute LBP. The subject complained of acute lumbar pain exacerbated when she was upright, and when she was engaged in the normal activities of daily life. At the time of the first observation, the patient was wearing a brace that was readily available commercially. We modified the non-individualized elastic brace that the patient had already purchased. Major improvements were observed in either or both of the Quebec Back Pain Disability Scale and Numerical Pain Rating Scale scores.
Conclusion: We speculate that the tailored bracing described in the present case may be a viable option in carefully selected cases.

Introduction

Lower back pain (LBP) can persist into adulthood as a sequelae of adolescent lumbar scoliosis, particularly under certain conditions influenced by aspects of bodily biomechanics and/or other factors. All pre-existing scoliosis; postural alteration; muscular imbalance; emotional factors; the need to spend long periods in awkward positions when engaged in professional work; and/or the absence of,

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or reduction in physical activity, can contribute to the worsening of scoliosis symptoms in adulthood. On the other hand, adolescent idiopathic scoliosis can usually be treated by appropriate bracing and exercise (Romano et al., 2013; Lusini et al., 2014; Fusco et al., 2011). LBP that worsens in an adult, accompanied by lumbar scoliosis, should be evaluated with consideration of certain issues that are not typically addressed in patients without lumbar spinal curve deformities. In fact, physical examination of an adult who complains of acute back pain may reveal a herniated disc, especially when the patient complains of radiculopathy. In adults, radicular pain in the absence of a spinal deformity is typically controllable (or at least reducible) by application of pharmacological and/or physiotherapeutic treatment. However, in patients with lumbar scoliosis, the symptoms may be more aggressive and less responsive to the above-mentioned conservative treatments.

Bracing is a viable therapeutic option for adult scoliotic patients with chronic LBP (Weiss and Werkmann, 2009). In such patients, the pain may be caused by deformities triggered by lumbar scoliosis at points peripheral to the pivot of the curve, including the shoulder and pelvic girdles. To date, several treatments have been used to treat lumbar and/or radicular pain including drugs, exercise, physical therapies, manual therapies, and a wait-and-see approach. For writing this case report we followed the CARE criteria (Gagnier et al., 2014). The principal purpose of this study was to describe the use of tailored bracing to reduce pain and improve function in an adult patient with pre-existing lumbar scoliosis suffering from LBP.

Methods

Case description

A 40-year-old female with a body mass index (BMI) of 18.4 kg/m^2 presented with acute LBP. The subject complained of acute lumbar pain exacerbated when she was upright, and when she was engaged in the normal activities of daily life. The patient remarked that the problem had recently become worse. In addition a previously initial pharmacological treatment with non-steroidal anti-inflammatory drugs, had not effect on pain intensity. In fact, at the first evaluation, she was asked to describe symptom's intensity using a 0—10 numerical pain rating scale (NPRS) where 0 represented the absence of pain and 10 the maximum pain perceived (Childs et al., 2005); the answer was 8.5. Furthermore, the Quebec Back Pain Disability Scale (QBPDS), which consists of 20 items yielding a total score of 0—100, was also used to quantify the functional limitation (Kopec et al., 1995, 1996); QBPDS score was 43. Major complaints (answers: "very difficult") were putting on socks, bending over to clean the bathtub, and lifting and carrying a heavy suitcase. Additional complications (answer: "fairly difficult") were getting out of bed, maintaining a sitting position for a long time, making the bed, moving a chair, pulling or pushing heavy doors, and carrying bags or groceries. Conversely, turning in bed, riding in a car, climbing a flight of stairs, or walking were not at all difficult. X-ray examination confirmed the presence of pre-existing left lumbar scoliosis (22° Cobb) with the apex at vertebra L_1 and vertebral apex torsion of 16° on the horizontal plan (Fig. 1A, B). The intervertebral body spaces were conserved in the lumbar tract, but their amplitudes were reduced in the dorsal tract (Fig. 1C). Palpation of the paravertebral muscles triggered pain in the lower dorsal tract. In addition, legs length measuring (anterior superior iliac spine to the internal malleolus in a supine position) did not highlighted any discrepancy: 89 cm for both limbs. In the present case, the initial evaluation did not included additional screening tests such as the Adam's forward bend test which has been recognized as a suitable evaluation tool, for the diagnosis of adolescent idiopathic scoliosis, in order to decide if patients need further X-ray examination (Horne et al., 2014). The case reported in this study described an adult subject; we were more oriented to confirming the diagnosis by X-ray examination.

Thus, the initial evaluation suggested that the patient was suffering from LBP caused by pre-existing structural scoliosis, so we thought it appropriate to address the scoliotic curve. Major concern in this case was the pain intensity which could make it difficult to treat. At the time of the first observation, the patient was wearing a brace that was readily available commercially. Thus, we sought to tailor the brace to the patient.

Intervention and outcome

We modified the non-individualized elastic brace that the patient had already purchased, and we modified the orthosis, via simple application of an elastic band, to form a typical (easily removable) elastic orthosis. The objective was to create a coronal shifting force in the direction of the concavity of the curve to modify the positions of the vertebrae affected by scoliosis. The elastic band ran downward to take advantage of the anchorage afforded by a stable structure such as the iliac wings of the pelvis (Fig. 2A, B). The midpoint of the elastic band was fixed with Velcro at the apex of the curve, on the side of the convexity. The two final portions were tensioned and fixed, using Velcro, to run from the side of the concavity of the scoliosis curve to the lower portion of the elastic brace (Fig. 2B). These therapeutic measures commenced 30 days after symptom onset (Fig. 3). The patient was informed of the nature of the study and gave her consent.

At 1 month after initiation of treatment (application of the customized brace) the subject was asked to describe her pain intensity and functional status; the NPRS and QBPDS scores were 2 and 15, respectively. The putting on of socks was "somewhat difficult"; and bending over to clean the bathtub, and lifting and carrying a heavy suitcase, were "minimally difficult". She was re-evaluated at 5, 7, 9, 12, and 24 months (Fig. 4). The patient came into pregnancy during the treatment timeframe (Figs. 3 and 4). In this regard, it should not be forgot that pregnancy have potentially altered the center of gravity and, consequently the nature of pain during this period. Major improvements were observed in the first 6 months, in either or both of the QBPDS and NPRS scores, and the improvements were still evident at the last follow-up. Both the QBPDS and NPRS scores improved compared to baseline, particularly in

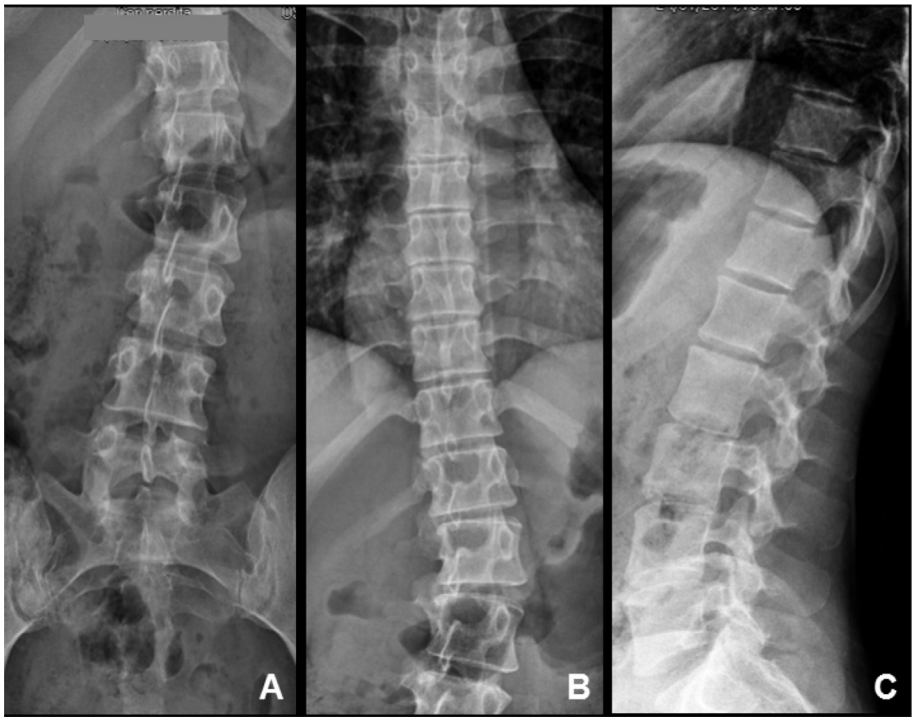


Figure 1 Pre-treatment X-rays. Left convex lumbar scoliosis with the apex comprised between the vertebral bodies of L_1—L_2 (A and B); Reduction in amplitude of intervertebral spaces (C).

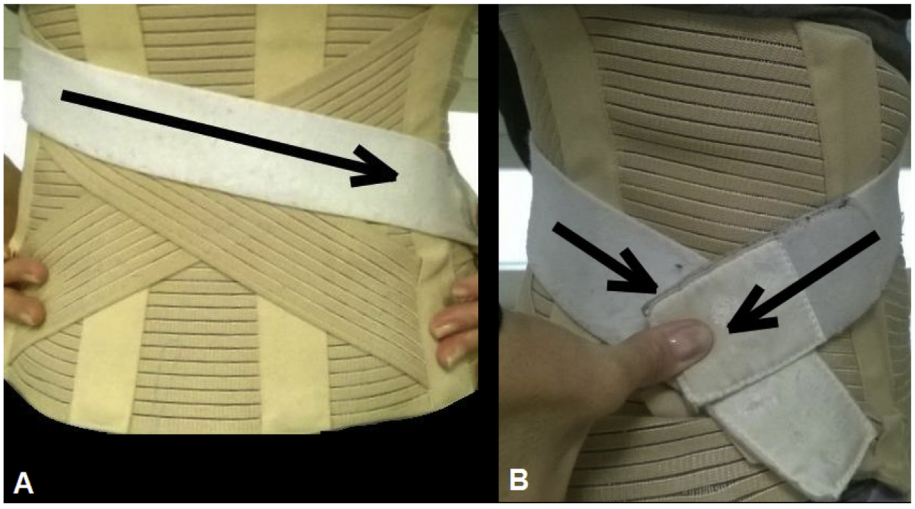


Figure 2 Posterior view: elastic band direction (arrow) (A); Lateral view (convexity side): elastic band direction (arrows) (B).

terms of the more challenging physical actions. In the present case, improvements from baseline in both QBPDS and NPRS were considerable: indeed, it should be highlighted that cutoff values have been proposed in order to define the minimal important change in the above-mentioned outcome measures (Ostelo et al., 2008). For both scales it was identified a 30% as minimal important change value. In our case the scores of the QBPDS and NPRS improved by 81% (from 43 to 8 pts) and 76% (from 8.5 to 2 pts), respectively (Fig. 4). No side effects were reported and the patient has adhered to the treatment without complications.

Discussion

Normally, adult scoliosis can be treated with bracing, and the treatment goal differs from that of treatment of adolescent scoliosis. In young patients, bracing seeks to obtain and maintain optimal spinal alignment, to allow the vertebrae to develop symmetrically until the bone is mature. In adults with mature bones, vertebral deformation is permanent. In such patients, the purpose of a brace is principally to support an unstable spine and reduce pain. Adults tolerate rigid braces poorly also because bracing should be throughout life, in their case. Certain elastic or

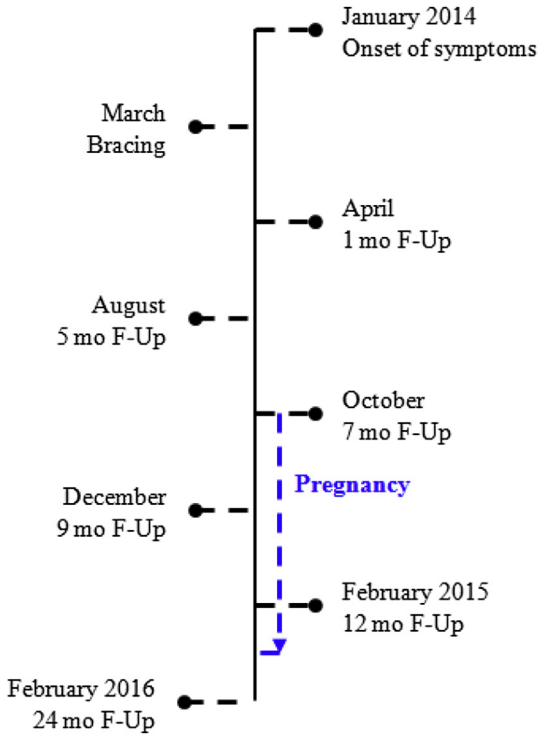


Figure 3 Timeline.

semi-rigid braces designed to reduce symptoms are commercially available, but are rather expensive. In the present case, bracing was well tolerated and the patient was comfortable with its use. We did not want to repeat the X-ray to measure the spinal curvature, as we could not hope to actually change the curve. Rather, the outcome measure was pain reduction. Finally, we wish to emphasize that we do not seek to replace the common bracing guidelines/prescriptions for subjects with lumbar scoliosis; conversely we would highlight the importance to fit the need of an individual patient also by means a tailored bracing as reported here.

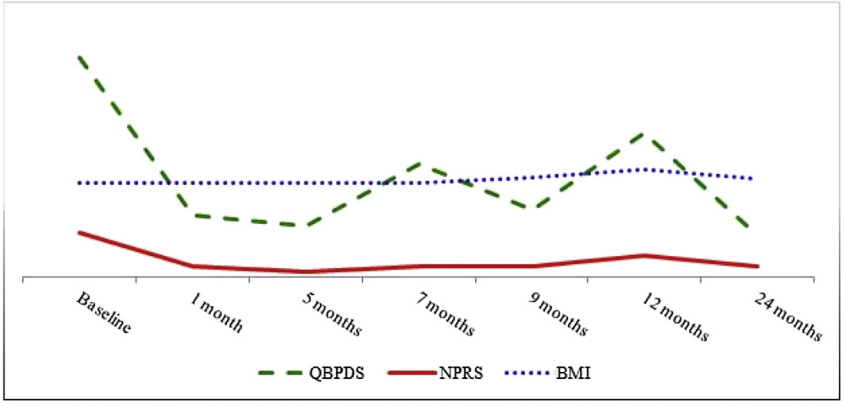
Limitations

Our work had major limitations. Our observations were not general in nature. Furthermore, the patient did not wear the brace for all months during pregnancy period; bracing was not possible after the third month of pregnancy. Thus, we hypothesized that any benefit associated with bracing would be confined principally to the pre-pregnancy/initial-pregnancy timeframe. We found that this was indeed true (Fig. 4).

Conclusion

Although our study had limitations, we speculate that the tailored bracing described in the present case may be a viable option in carefully selected cases. In this study, improvements in the patient persisted, indicating that the treatment was useful. Thus, a simple and inexpensive intervention was able to free the patient of pain.

Variable	Score						
	Baseline	*1 mo*	*5 mo*	*7 mo*	*9 mo*	*12 mo*	*24 mo*
QBPDS	43	12	10	22	13	28	8
NPRS	8.5	2	1	2	2	4	2
BMI	18.4	18.4	18.4	18.4	19.5	20.9	19.1



(QBPDS: Quebec back pain disability scale. NPRS: Numerical pain rating scale. BMI: Body mass index).

Figure 4 Measurements: pregnancy timeframe is highlighted in the timeline.

Conflict of interest statement

The authors declare no conflicts of interest.

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