

AN INTEGRATED COMPREHENSIVE TAILOR-MADE REHABILITATION CONSERVATIVE TREATMENT FOR IDIOPATHIC ADOLESCENT SCOLIOSIS

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ABSTRACT

Scoliosis is an abnormal lateral curvature of the spine associated with or without rotation of the vertebrae. Scoliosis is not just a cosmetic problem, but it has impact on many aspects of a person's quality of life. One's can experience pain, posture, respiratory, psychosocial problems. In This case report we would like to demonstrated an integrated comprehensive, tailor-made rehabilitation treatment for adolescent scoliosis. The patient is a 15-year-old female with complaints of scoliosis and back pain. Her first menarche was when she was 11 years old. No medical Problem was found. She loved to hang out with her friends and family but since her back hump getting worse, she ashamed of herself and sometimes refused to meet them or cover it with thick layer clothes. The pain in scale of 6 has been present for 1 year. She is unhappy with her body alignment and posture. From physical examination we found The Adam forward bend test was positive. From the x-ray before treatment showed the cobb angle was 20. Pelvic tilt (+), Risser sign 3-4, with Scoliosis C Curve. She can easily do her activities without feeling easily tired nor dyspnoea. She was prescribed a tailor-made Boston brace, physical exercise, heating modality, psychosocial intervention. After 12 weeks of therapy and bracing there was an improvement in posture, minimal pain (3-4), and she became more confidence and happy. The spine malalignment and the curvature can compress spinal disks, irritate nerve, strain joints, tighten muscles and it leads to pain. Because of this spine malalignment can affect posture it can leads to a psychosocial problem. Since the cobb angle was 20 degrees, no full maturation found, it is indicated for Brace prescription, to correct posture and prevent progressivity of curve angle. A proper exercise with heating modality can decrease muscle spasm and pain, maintain flexibility and strengthen spine/core muscle. The earlier diagnosis and treatment of an adolescent scoliosis can give so much different; it depends on the maturation and the cobb angle. In this comprehensive treatment needs a support not only from the patient but also from her society.

Introduction

Scoliosis is an abnormal lateral curvature of the spine associated with or without rotation of the vertebrae. Idiopathic scoliosis is a structural curvature which there

is unknown underlying cause. Idiopathic Scoliosis is divided into three groups by the age of presentation: infantile (0 to 3 years), juvenile (3 to 10 years), and adolescent (greater than 10 years). Adolescent Idiopathic

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Scoliosis (AIS) is the most common of all with prevalence of 0.47 – 5.2%, female to male ratio ranges from 1.5: 1 to 3:1. (Konieczny et al., 2013) Scoliosis is not just a cosmetic problem, but it has impact on many aspects of a person's quality of life. One's can experience pain, mobility problem, cardiopulmonary malfunction, emotional and behavioural problem (Frontera et al., 2019).

Research Methods

A fifteen years old girl came to PMR ward with scoliosis. Her right back looked more prominent than the left side. It was known at first time by herself and her mother about two years ago. She complained pain over her lower back for 1 year, since her back hump getting worse, she ashamed of herself and sometimes refused to meet them or cover it with thick layer clothes. She is unhappy with her body alignment and posture. She still can-do activities without feeling easily tired nor dyspnoea. She had never complained any weakness nor numbness nor tingling sensation. She followed sport session in school but sometimes feel pain over her back. She never complained any weariness in her activity. The first menarche was when she was 11 years old.

She could do the independent ambulation with normal gait by herself, she was right-handed. Due to difficulty from the patient to attend the 6MWT Schedule, we use The Duke Activity Status Index converted to METs score to estimate her functional capacity, and it was 21.45 from DASI and 5.38 METs score. From physical examination we gathered some data, her vital signs were within the normal limit, body weight 39kg, with body height 154cm. The Adam Forward Bending Test was positive (+), the pain scale was 6 over 10, Standing and sitting evaluation showed asymmetrical shoulder height, right thoracic hump from VTH 5 – VTH12, with the apex in VTH 9, there were good flexibilities of vertebra, reflected by the changes of the curve on right and left lateral bending. Pelvic tilt was positive (+). On palpation were found muscle spasm on upper and lower back area, no pain, no hamstring tightness.

From the X- Ray Photo before rehabilitation (Figure 1) we gathered some data such as: the Cobb angle was 20, with no maturation found with Risser sign was 3 – 4 , C Curve.



Figure 1

X-Ray Thorax and Pelvic Before Rehabilitation Program, and Brace Use

Results and Discussion

A. Result

After 12 weeks of rehabilitation program there was an improvement in her posture, pain rating scale was (3-4), and using this Boston Brace made her more confidence and happy.

B. Discussion

Scoliosis is an abnormal lateral curvature of the spine associated with or without rotation of the vertebrae. Idiopathic scoliosis is a structural curvature which there is unknown underlying cause. Idiopathic Scoliosis is divided into three groups by the age of presentation: infantile (0 to 3 years), juvenile (3 to 10 years), and adolescent (greater than 10 years). (LAWRENCE A. RINSKY, 1988) From the case, the patient was fifteen years old the range age on adolescent group. So that's why the diagnosis was Adolescent Idiopathic Scoliosis.

Due to difficulty from the patient to attend the 6MWT Schedule, we use The Duke Activity Status Index converted to METs score to estimates her functional capacity by call her and asked those questioners. Based on the recent study showed that Duke Activity Index Score (DASI) has high criterion validity for assessing functional capacity and warranted in addition to the 6MWD. (Carter et al., 2002) From American Heart Association also stated that DASI can be used to estimate exercise tolerance. (Arena et al., 2007) The DASI provides a simple screening tool to characterise functional capacity (Riedel et al., 2021). In Duke Activity Score Index the higher the score with maximum 58.2 the higher the functional status. To convert it to METs score we need the VO₂ Peak. With this following calculation. $VO_2 \text{ peak (mL/Kg)} = 0.43 \times \text{DASI} + 9.6$. METs (Metabolic Equivalent) = $VO_2 \text{ Peak} / 3.5$. (Hlatky, n.d.) The METs score of this patient was 5.38 means the pulmonary capacity was within the normal value.

Individuals with idiopathic scoliosis have more concern about their body appearance. (Savvides et al., 2020) So, the

Low Back pain that occurs in scoliosis most likely to be categorized as non-specific low back pain. (Weinstein et al., 2003) This term is used when the pathoanatomical cause of the pain cannot be determined. (Maher et al., 2017) One of the aetiologies of non-specific low back pain in scoliosis is the muscular imbalance. The back muscle located either side of the spine can be heavily impacted by a sideways curvature, and the patient will find that the muscles on one side are weaker than the other, spasm at the strong side of the back muscle. It can be happened due to overused of the other muscle who needs to make up for the curvature. This problem can lead to a back pain and discomfort, as some muscles are overworked while others begin to atrophy. (Erika, 2017) Based on research done briefly there was a correlation between abdominal trunk muscle weakness in Low Back Pain. (Kato et al., 2021) In this patient the weakness of abdominal trunk muscle can contribute in her lower back pain. When a person experience pain it can affected their quality of life by limiting their activities.

The problems that occur in scoliosis patient is not only about their cosmetics and low back pain but also one's quality of life. In this case report the patient felt ashamed of herself because of her body awareness issues, she needed to cover her back hump with thick clothes, and made her refuse to meet her family and friends. Based on a study by Payne et al., they said that scoliosis was an independent risk factor for suicidal thought, worry and concern over body development, and peer interactions after adjustment. (Payne III et al., 1997) Some study also showed that

earlier diagnosis and treatment the better the result, but we need to assess whether the patient need to be referred to the

Psychiatry or not, from the anamneses there was no suicidal thought, she still can do her daily activity, she never feels useless, and because of this consideration we would like to give her an education first, if there is some red flag at the follow up, we will consider to referred her to the psychiatry. Based on the study done by Derry Law et al., said that co-designing with patients on the aesthetic aspects of the surface design of the brace increases the level of user compliance and induces positive user perception. Therefore, the brace was tailor made, made specially for specific patient, because it can influence on one's mood and improve their quality of life ([Law et al., 2017](#)).

Scoliosis can lead to postural imbalance because of changes in trunk muscle strength, and it can contribute to cosmetical problems, curve rapid progression and pain. The exercise including extension exercise for shortened muscles near the spine, core stabilization can be attributed to spine stabilization for muscle imbalance that occurs from asymmetric posture in trunk, and based on research demonstrated it effect on alleviating chronic low back pain. ([Hodges, 2003](#)) Core stabilization exercise has been proposed as effective in increasing lumbar stability by enhancing cooperation between cocontraction of extensor and flexor muscle and neuromuscular control function. ([Barr et al., 2005](#)) A recent study demonstrated that there was an effect of core-based exercise in people with scoliosis it can significantly improve the cobb angle and quality of life ([Li et al., 2021](#)), because in this series of exercise an individuals can increase their concentration, reduce emotional disturbance and improve their self-efficacy. ([Chan et al., 2019](#)) Therefore, core stabilization exercise may be used effectively to increase lumbar

muscle strength and improve neuromuscular imbalance, which are the cause of AIS.

One of the main problems in AIS is pain, that can affect one's quality of life. There were so many ways in managing pain from exercise to modality treatment. One of the modality treatments is heat treatment. Most forms of lower back pain associated with muscle spasm, as a result of this condition the circulation is restricted and pain signals are sent to brain. Heat therapy can help this condition by increasing blood flow, delivers more oxygen and improves blood circulation into the muscle and help to relax and reduce related pain ([Petrofsky et al., 2013](#)).

In Managing the progression of curvature and cobb angle deepens on its degree (Table 1). The goal of brace treatment for AIS is to halt the progression of a curve and to improve cosmetic appearance in accordance with maintaining whole body alignment and balance during a period of growth. Based on a study from Bracing in Adolescent Idiopathic Scoliosis Trial (BrAIST) showed evidence that bracing was effective statistically reduce the number of AIS progression to high-risk curve and threshold for surgery. ([Weinstein et al., 2003](#)). Since the cobb angle was 20 and risser sign was between 3 to 4 it doesn't need any operational procedure, and Boston Brace is the best type of Brace she can afford. Since Boston brace is effective for scoliosis ranging from 20 to 49 between T6 – L4. Milwaukee brace is not recommended because the success rate of this brace when cobb angle between 20 - 29 with a Risser sign between 0 – 1. ([Kaelin, 2020](#)).

Conclusion

The earlier diagnosis and treatment of an adolescent scoliosis can give so much

different; it depends on the maturation and the Cobb angle. In this comprehensive treatment needs a support not only from the patient but also from her society

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