

The Neurological Problems Caused By Scoliosis And The Possible Treatment Options
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ABSTRACT:

This literature review explores the neurological effects of scoliosis and the effectiveness of different treatments. It highlights that scoliosis can cause several neurological problems such as radiculopathy, which can impair motor control and cause tingling sensations. This review suggests that treatments like bracing, surgery, and exercise can help reduce these neurological symptoms. However, the effectiveness of each treatment varies depending on the patient, highlighting the importance of consulting medical professionals for individualized treatment plans. The review emphasizes the need for more studies to further understand the neurological effects associated with scoliosis. It also mentions that limited studies with relevant data hinder the research findings. Nonetheless, methods that have been proven to improve the Cobb angle and dexterity can potentially benefit the neurological health of scoliosis patients. The review aims to provide information that can educate patients on the importance of scoliosis treatment and its impact on their quality of life.

INTRODUCTION:

Scoliosis is well identified as a physical deformity causing excessive curvature of the spine. Scoliosis is further categorized by the extent of the curvature, which is done using a measurement called the Cobb angle. A Cobb angle greater than 10 degrees is considered scoliosis. Idiopathic scoliosis is the most common type of scoliosis and is most commonly diagnosed in adolescents age 11 and older. It is more prevalent in girls than boys and is more likely to be found in those who have close relatives also with scoliosis. Screening can be done in many ways with the most common ways being physical examinations or x-rays. Severe or untreated scoliosis can affect the life span of patients, although this is dependent on the patient's curve severity. In some cases scoliosis affects their quality of life and neurological health. This paper discusses the neurological problems that impact patients with moderate to severe cases of scoliosis, defined as a Cobb angle of 40 degrees or higher. The problems include conditions such as tension headaches, issues with the recirculation of cerebrospinal fluid (CSF), radiculopathy, and compressed nerves. All forms of scoliosis can lead to life altering neurological symptoms. Adolescent Idiopathic Scoliosis (AIS) is prevalent with about 2-2.5% of adolescents diagnosed with it [1]. Because it is so common, there have been many types of treatment explored for the deformity correction of scoliosis including core stabilization exercises, Schroth exercises, surgery, and bracing. These methods have been proven to improve the Cobb angle, dexterity, and in turn help with the neurological health of patients. However, treatment plans may vary depending on the individual

patients age, condition severity, curvature location, and condition type [2].

This review aims to explain the neurological issues relevant to scoliosis as well as the mitigation of scoliosis related issues through treatment. It can be used to help patients better understand scoliosis and the potential treatment they can receive, as well as help identify the gaps in the research of scoliosis. This data can be used to educate patients on the importance of scoliosis treatment and the impact treatment has on patient quality of life.

METHODS:

This review employs published studies found on the Pubmed database and independent research articles written by reputable medical professionals. For the research question defined as “How can early diagnosis along with treatment affect the severity of scoliosis neurologically?,” key terms such as “Scoliosis back pain”, “Scoliosis nerve pain”, “Scoliosis risk factors”, “Untreated scoliosis”, “Undiagnosed scoliosis”, “Scoliosis brain”, “Scoliosis symptoms”, “Scoliosis side effects”, and “Brain damage scoliosis” were used to search on Pubmed. Phrases such as “Scoliosis effect on the nervous system” and “How scoliosis affects that body?” were used when conducting internet searches. Seven peer-reviewed articles were selected based on authenticity, relevance to research questions and being published within the last 15 years.

RESULTS:

Both Nalda [2] and Lowenstein [3] found that there were numerous neurological problems caused by scoliosis. Both studies explained that it causes radiculopathy which is defined as a painful tingling sensation capable of impairing fine and gross motor control. Both studies stated that the prevention of recirculation of CSF can leave the brain with inadequate levels of CSF surrounding it, leading to tension headaches and sometimes migraines.

Romberg et al [4] and Weinstein et al [5] talked about the effectiveness of bracing and how it affects scoliosis patients. Romberg et al [4] focused primarily around the strength and dexterity of patients who underwent bracing and was able to find that early bracing was significantly more effective by comparing Early Onset Scoliosis (EOS) patients to AIS patients. Weinstein et al [5] focused on AIS patients and concluded that bracing reduced the progression of severe curvature of the spine. The study further concluded that the longer the braces were worn the more the benefit, including a greater likelihood of reaching skeletal maturity with less than a 50 degree curve and less warrant for surgery. Smith et al [6] found that within a two-year follow up evaluation, patients who underwent surgical treatment had reduced back pain and disability which improved overall patient health. Improvements were measured through a Numerical Rating Scale (NRS), determined by patient numerical estimation of their back pain. The mean NRS in non-operative patients

did not significantly improve while the mean NRS in those with operative treatment were found to have significantly improved. The NRS was lower for patients who underwent surgery indicating that surgery can reduce back pain and improve patient quality of life. Both Kocaman et al [1] and Anwer et al [7], found that exercises improved Cobb angle, angle of trunk rotation, peripheral muscle strength, thoracic kyphosis angle, lumbar lordosis angle, spinal mobility, and quality of life. Kocaman researched two specific exercise treatments including the Schroth's exercise and core stabilization exercises. Schroth method was found to reduce Cobb angle and improved spinal mobility, while the core exercises were more effective with improving peripheral muscle strength. The study done by Anwer provides evidence that a broader set of exercises improved quality of life for those with scoliosis. All studies showed that there are many neurological problems associated with severe cases of scoliosis and the treatment options that can be used to improve high-risk scoliosis and its neurological symptoms.

DISCUSSION:

Information gathered from both Kocaman et al [1] and Nalda [2] suggests that Schroth's exercises might be most successful for boosting overall health and reducing neurological issues due to scoliosis. Nalda [2] concludes that symptoms including radiculopathy, nerve problems, impairment of fine and gross motor control, decreased levels of CSF surrounding the brain, and tension headaches are related to the curvature of the spine with the symptoms escalating with the severity of the curve. Because the Schroth's exercise has demonstrated it reduces the Cobb angle, it can be more useful for treating these neurological symptoms than other exercises. Additionally, as Anwer et al [7] implies, many forms of exercise are beneficial for scoliosis and exercises are generally useful for patients with scoliosis.

From the information gathered from both Smith et al [6] and Lowenstein [3], surgical treatment is recommended to reduce back pain by treating curvature of the spine in scoliosis. As explained in Lowenstein [3], the curvature of the spine compresses nerves and creates radiculopathy that leads to pain for those with scoliosis. Surgery to treat scoliosis reduces the curvature of the spine thus reducing the issues causing the back pain. Information from studies Nalda [2] and Weinstein et al [5] suggest that bracing can decrease the risk of curve progression and reduce the possibility of neurological symptoms. It is concluded in Weinstein et al [5] that bracing has a high success rate with a positive correlation between the number of hours worn and its success. The larger the Cobb angle, the more the likelihood and severity of these neurological problems increases. Therefore, by reducing curve progression bracing lessens the risk of these neurological problems. Although both Romberg et al [4] and Weinstein et al [5] conclude that bracing is beneficial,

Romberg et al [4] emphasizes that it is best to treat patients by bracing when they are younger. Romberg et al [4] even concludes that EOS patients have better results than AIS patients with bracing. Each study listed a multitude of reasons as to why this occurs. In Weinstein et al [5] only AIS patients were studied for bracing without any comparison made with age, making it unclear how beneficial bracing actually will be or what ages bracing should be used. For these reasons the effectiveness and age ranges for bracing should be more explored and further researched.

This literature review suggests that with treatments such as bracing, surgery, and exercise we can reduce many neurological symptoms of scoliosis patients. Additionally, the effectiveness of each treatment is dependent on the patient and treatment plans should be discussed with medical professionals. However, there were limited studies with relevant data, meaning the research findings are repressed. There were a restricted amount of sources talking about neurological symptoms of scoliosis. Although many databases were inspected, few articles actually reported the neurological damages. For these reasons, more studies exploring the neurological problems in scoliosis need to be conducted, including those that investigate the presence of neurological problems in scoliosis and its impact on a patient's quality of life.

Reference:

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