

Case Report

Improving Quality of Life in Geriatric with Pain due to Scoliosis and Old Compression Fracture: A Case Report

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Abstract

Scoliosis frequently causes problems in geriatrics, particularly pain. The approach to the diagnosis and management of pain in the elderly is more challenging than in young adults. Thus, pain management is needed for patients with scoliosis. In the elderly, pain is independently linked to a higher incidence of disability. Therefore, pain management is crucial for older people who live in the community and want to maintain their independence. We report the case of a 71-year-old man referred from the Neurology Department with pain due to scoliosis and an old compression fracture, making him incapable of walking, becoming dependent, and having a high risk of falling, thus resulting in a decreased quality of life. Physical examination revealed hyperkyphotic thoracic, tenderness and spasms on the paraspinal muscles, with no weakness in the extremities but decreased sensory function on both dorsum of the feet. This patient also had decreased chest expansion and was conservatively managed. The goals of this treatment were to relieve pain, improve sensory function, and improve the quality of life. He underwent a staged rehabilitation program, starting with a combination of transcutaneous electrical nerve stimulation (TENS) and microwave diathermy, breathing, and core muscle strengthening exercises. After 10 weeks, the pain was relieved, there was a lower risk of falling, an improvement in chest expansion, and a higher quality of life. Improving the quality of life of geriatric patients requires a multi-dimensional approach. The main goals for this patient were relieving pain, enhancing cardiorespiratory endurance, and preventing falling. Each exercise must be safe considering the patient's age, health condition, and vertebral fractures. Family support is important to monitor and encourage patients during the program.

Keywords: *Geriatric, old compression fracture, pain, quality of life, scoliosis.*

INTRODUCTION

Scoliosis is a spinal deformity characterized by lateral curvature with or without spinal rotation. Scoliosis in adults can be either degenerative or idiopathic scoliosis.¹ The etiology and pathophysiology of scoliosis cannot be determined with certainty. Possible etiologies of scoliosis include heredity or genes, posture, vertebral anatomical abnormalities, and systemic diseases.² Based on data from the National Scoliosis Foundation USA, cases of scoliosis are found in 2-3% of the total general population in the world today, and most literature states that degenerative lumbar scoliosis occurs in 7.5–15% of the population.^{3,4}

Problems arising from scoliosis are decreased quality of life and disability, pain, cosmetically disturbing deformity, functional impairment, pulmonary problems, possible progressivity in adulthood, and psychological disorders.^{5,6} More than 99% of patients with spinal diseases, including scoliosis, complain of back pain in one location or diffuse; other symptoms are muscle weakness, tingling,

decreased sensory function, and impaired urination and bowel function.⁴

The approach to the diagnosis and management of pain in the elderly is more challenging than in young adults. Any persistent pain (persisting for >3 months) that has an impact on physical, psychological, or quality of life should be interpreted as a serious problem.^{7,8} Chronic back pain is associated with a significantly reduced quality of life. This is because pain can hinder the process of adapting to changes in activities experienced by the elderly.^{8,9}

CASE REPORT

A 71-year-old man lived independently with scoliosis and compression fractures for decades of his life without any symptoms. He started to feel severe radiculating pain (VAS 6) in the last 3 months, making him incapable of walking, became dependent (Barthel Index 11/20), and had a high risk of falling (Fall Risk Scale 10), thus resulting in a decreased quality of life (general health status 50/100 in the EQ5D instrument). Physical examination

revealed hyperkyphotic thoracic, tenderness, and spasms on paraspinal muscles with no weakness on extremities but decreased sensory function on both dorsum of the feet. The patient also had decreased chest expansion (2-2-2 cm). X-ray examination showed thoracolumbar scoliosis, lumbar spondylosis, and compression fractures on T12, L2, and L3. Since he refused any injections or surgical options, he was conservatively managed.

The patient had worked as a heavy worker for more than 30 years. While he had been working, he fell a few times but did not receive further medical examinations. Currently, he is unemployed and lives in a one-story house with his family. His son and daughter are the most responsible for assisting him in his daily activities.

He underwent a staged rehabilitation program, starting with a combination of transcutaneous electrical nerve stimulation (TENS) and microwave diathermy to relieve pain and improve sensory function. As soon as the pain was relieved, he began to strengthen the quadriceps, gastrocnemius muscles, and pelvic tilt exercises. Walking

and balance exercises were subsequently prescribed. Chest expansion exercises were performed with a slightly retracted shoulder.

After 10 weeks, the pain had decreased (VAS score 3). He lived independently (Barthel Index 19/20) with a low risk of falling (Fall Risk Scale 3) and an improved quality of life (70/100). The chest expansion increased to 2-4-2 cm. He was able to walk inside the house, but he was still complained about fatigue. The patient was currently continuing the rehabilitation program with a focus on increasing cardiopulmonary endurance to improve activity tolerance. Movement restrictions were prescribed, and vertebral X-ray was planned to be held in the upcoming 4 months.



Figure 1. Back view of a patient with scoliosis



Figure 2. Lumbosacral vertebrae AP-Lateral X-ray, showing lumbar scoliosis and spondylosis, compression fracture on T12 L2 L3 with L3-4 disc and foramen narrowing, straight curve et causa suspected muscle spasm.

DISCUSSION

Management of pain in elder adults is a unique challenge, as these complains occur more frequently and are often undertreated. They often hide their pain complains for fear of requiring further treatment or examination. In the elderly, functional disability is impacted by moderate to severe pain or chronic pain; in particular, severe pain was independently linked to a higher incidence of disability. Therefore, pain management is crucial for older people who live in the community and want to maintain their independence.¹⁰ A study reported that the incidence of pain at the age of >60 years is more than twice that of those aged less than 60 years. Pain that often receives less attention can cause

depression, anxiety, sleep disturbances, and mood changes, so that it can reduce the quality of life.¹¹

Pain

In our patient's case, scoliosis and compression fractures caused vertebral instability, resulting in pain, neurological deficits, and a high risk of further deterioration. The anatomical abnormality of the vertebrae that occurs in patients causes the concave side of the curvature to receive abnormally high pressure compared to the convex side.⁵ This causes the supporting tissues around the spine (muscles) to compensate. Constant or repetitive posture in the same position can cause muscle tension. Sudden movements of tense muscles can cause spasms. Muscle tension and spasms can cause muscle contractions accompanied by intense pain. Each movement will increase the pain as well as the contraction, so there will be a cycle of pain, muscle spasm, and inability to move.¹

When the patient was first arrived, he complained of moderate pain (VAS score 6). Back discomfort in adults with scoliosis is mainly brought on by strain on the facet

joints and spinal discs. The curvature of the spine may aggravate the nerves and result in their stretching. Additionally, stressed joints might develop uncomfortable inflammation. The main objectives in the rehabilitation of these patients were to reduce pain and discomfort, improve their functional abilities, and minimize the occurrence of complications to improve their quality of life. Pain reduction was one of the short-term targets of rehabilitation treatment for this patient.⁸ Inadequately managed long-standing pain or persistent pain will result in deterioration of functional ability and ultimately in frailty.¹² Frailty has been shown to increase morbidity and mortality rates in older adults. Frailty will also affect the length of the patient's recovery, which will have a psychological impact on the patient and even the family members who care for them.¹³

The patient has received pharmacological therapy from the Neurology Department. He underwent a staged rehabilitation program, starting with a combination of TENS and microwave diathermy to relieve pain and improve sensory function. TENS and microwave

diathermy was administered to the paralumbar area and aimed at relieving both neurological and somatic pain in this patient. TENS is a therapeutic device that uses electronic waves to reduce pain.¹⁴ TENS is one of the most frequently used therapeutic devices to reduce pain, such as myofascial, neuropathic, and arthritic pain. TENS is used to reduce pain in new (acute) and old (chronic) conditions. TENS is divided into high and low frequencies.^{15,16} The working mechanism of TENS is to stimulate fibers that can reduce pain. This stimulation closes the gate of pain conduction from dendrites to neurons, and then neurons will inhibit pain stimulus to the brain, increase blood circulation to the painful area, and stimulate the production of endorphins as the body's natural painkiller. TENS is believed to be safe and well tolerated by everyone, including the elderly, with few or no side effects. But it must be noted that contraindications to the use of TENS include pregnancy, epilepsy, and people who use pacemakers.¹⁷

A systematic review and meta-analysis reported that TENS provides enormous benefits for improving VAS scores. TENS is

considered one of the therapies that improves chronic pain in older adults.¹⁸ In this patient, TENS was also administered to the lower legs. A study mentioned that electrical sensory input performed in combination with routine therapy can improve motor function in lower extremities with impairment and late motor function without spasticity.¹⁹ TENS, which are very easy to obtain and affordable, are certainly very helpful for patients in improving their condition.

In this case, TENS was combined with microwave diathermy, each for 20 minutes, two times a week. With a suppression of the inflammatory response and an enhancement in local blood circulation, microwave diathermy improves neuronal regeneration.²⁰ Microwave diathermy is considered safe and can reduce pain and improve the quality of life of patients with musculoskeletal disorders.²¹

Fatigue

The patient had been immobilized due to the pain for 3 months. Inactivity among the elderly will result in a decline in physical fitness components. This results from diminished cardiac output, diminished peripheral tissue perfusion, diminished lung respiratory capacity, diminished muscle mass, and diminished muscle contraction capacity.²² He was complaining of tiredness after sitting for a long period of time during the day, saying that sometimes the pain does not get better with rest. Muscle strength is all good, but we found decreased chest expansion (2-2-2 cm) in this patient. Decreased chest expansion was assumed to be caused by restricted chest movement due to scoliosis, hyperkyphosis, protracted shoulder, or aging-associated reduced chest wall compliance. A chest expansion capacity of 3.8 cm is substantially associated with decreased vital capacity. Respiratory infections are more likely to occur when vital capacity is decreased.²³



Figure 3. Chest expansion exercise

For effective respiratory muscle contraction and chest movement, the soft tissue around the chest wall and the respiratory muscles must be appropriately lengthened. Chest mobilizations improve thoracic compliance and chest wall mobility. Increasing thoracic rib mobility and expanding the range and quality of thoracic extension and rotation are the two main treatment goals. Procedures for mobilizing the chest include rib torsion, lateral stretching, back extension, lateral bending, and trunk rotation. In this patient, rib torsion and trunk rotation were avoided because of

multiple thoracolumbar compression fractures. Excessive trunk rotation was excluded from the study. In this patient's case, chest expansion exercise was mostly performed in the sitting position, stretching the accessory muscles of respiration, such as the scalene, pectoralis major, sternocleidomastoid, upper trapezius, and serratus anterior. The exercise was given as a daily home program, three times a day, with 10 repetition in each session. Stretching of the respiratory muscles has been proposed as a treatment for improving ventilatory patterns by reducing the rigidity of the chest wall. Self-stretching through deep breathing exercises was also given.^{24,25}

To increase activity tolerance, daily aerobic exercise was also given through arm-cranking. It was given low intensity, starting at 5 minutes and gradually increasing to 10 minutes, 2-3 times a day. The initial exercise was done in the hospital to evaluate the patient's tolerance during and after the exercise, and the rest was done as a home program. If the patient reached a score of 11 on the Borg Scale (rate of perceived exertion), the exercise was terminated.

Outcome and Long-term Management

After a 10-week rehabilitation program, there was an improvement in the patient's pain (VAS score 3). The improving pain allowed him to live independently (Barthel Index 19/20) with a low risk of falling (Fall Risk Scale 3) and an improved quality of life (70/100). However, we have to consider that adults with scoliosis typically have a long-term, progressively worsening backache and increased deformity. In the later phases, superimposed leg pain and subsequently progressive leg weakness appear.

A study reported that curves with a Cobb angle greater than 30 degrees, lateral listhesis of 6 mm or more, the depth of the L5 measured from a hypothetical horizontal inter-crestal line, and curves with an increased apical rotational component all predicted curve progression statistically significantly. Rarely, there is acute neurological deterioration and sphincter involvement, and on re-imaging, there may be acute curve advancement from an osteoporotic lumbar compression fracture or a severe disc herniation.²⁶

It is generally recognized that as patients age, postural alterations brought on by scoliosis, notably coronal and sagittal imbalance, can cause discomfort and worse quality of life. The impacts of the natural degenerative aging process are also likely to be amplified by any deviation from normal alignment. Adults with spinal deformities might experience severe age-related problems due to a combination of aging-related declines in skeletal muscle mass (sarcopenia) and bone mineral density (osteoporosis).²⁶

Postural instability should be corrected to aid in the effective prevention of pain recurrence. Exercises on the core muscles and extremities are essential for regaining normal posture. Core muscle exercises also served to support the position of the spine.²⁷ At that time, the patient was given several exercise programs. Exercise can be defined as a physical activity that is planned, structured, and done repetitively. Exercise is done by moving the body with the aim of improving or maintaining physical fitness components, such as balance, coordination, muscle strength, flexibility, and so on. WHO recommends

that adults aged 65 years and older practice aerobic exercise for 150 minutes of moderate intensity or 75 minutes for heavy intensity and two or more days a week of muscle strength exercises. Exercise can also serve as medicine, i.e., to prevent disease, treat as a supplement to the effectiveness of treatment or surgery, substitute safer treatments, and be an alternative treatment when no effective treatment is available.²⁸

In all cases, the sequence of exercise delivery should be considered. Starting with the introduction of muscle strength exercises, then balance exercises, and finally aerobic exercises. This exercise sequence may be the key to successful and safe therapy.²⁸ The patient was given strengthening exercises initially. These are muscle-specific exercises that target the production of muscle strength and speed. Maintaining muscle strength is essential to prevent age-related declines in functional capacity and aging-related declines in muscle mass and strength. A decline in muscle strength is considered a disability in older men, but also in women. Muscle strength is strongly associated with the ability of the elderly to perform daily

activities. Increased muscle strength is also associated with a decreased incidence of falling in the elderly. The combination of muscle strength training with slow concentric velocities can optimize functional ability, reduce falling and stimulate muscle hypertrophy.²⁹ This patient began to do strengthening exercises for quadriceps, gastrocnemius muscles, and pelvic tilt. A study says that posterior pelvic tilting exercise and L4 movement have a significant effect on improving back function and pelvic pain.³⁰ The patient's hemodynamic were stable during exercises.

Lower extremity strengthening exercises were performed through seated knee extensions for quadriceps and a prone hamstring curl. Core muscle strengthening exercises were performed through pelvic tilt exercises. The patient was told to lie down on the bed with knees bent, tighten the abdominal muscles, begin to press the lower back into the bed, and relax. Each movement was held for 6 seconds, repeated 10 times, and done three times a day.

The patient's risk of falling increased due to his inability to walk. For this reason,

balance exercises were given after strengthening exercises.



Figure 4. Strengthening of quadriceps



Figure 5. Strengthening of hamstring



Figure 6. Pelvic tilt exercise

This exercise serves to train posture and balance so that the risk of falling can be reduced. The exercise is given gradually according to the patient's ability. The

challenge of this balance exercise itself is the possibility of accidental falls, so we must train the most challenging movements that the patient can do in a safe environment without falling. At first, the patient was asked to practice standing up from the wheelchair with both hands without the help of others, then it was increased to walking training using a cane. Once the patient is able to walk on their own, the exercise progresses to tandem walking with supervision. This balance exercise is a preliminary exercise given before the patient is given aerobic exercise.

The chest expansion increased to 2.5-4-2.5 cm. He was able to walk inside the house, but still complains about fatigue. The patient was currently continuing the rehabilitation program, with a focus on increasing cardiopulmonary endurance to improve activity tolerance. Aging is associated with a decline in cardiorespiratory capacity, where there is a decrease in maximal cardiac output caused by a reduced maximum stroke volume, heart rate, and oxygenation changes. Aerobic exercise can prevent this aging phenomenon. Aerobics induces central and peripheral

adaptation mechanisms by increasing maximal oxygen uptake and increasing the ability of skeletal muscle to produce energy. Walking-based aerobic exercise should be encouraged because walking limitations in scoliosis patients are associated with decreased pulmonary function and poor breathing during exercise.³¹ However, this patient has limitations in terms of safety in walking due to a balance impairment related to declining muscle and sensory functions. We determined to give arm-cranking exercise since it could have similar potential for increasing exercise tolerance, despite the difference in muscle targets.³²

The inability to walk made this patient dependent on others. As an older adult, the patient wants to live well and optimally. For this, an older adult is required to perform daily activities independently. The Barthel Index (BI) is an instrument used to evaluate a person's independent functioning in performing daily activities. In Indonesia, the BI instrument is believed to reliably measure the basic functional status of geriatric patients.³³

There was no frailty in the patient and, thus, a good potential for independence. The patient's vision, hearing and memory functions were good. He had no medication records that increased the risk of falls or instability, such as opioids. He was only administered amlodipine (1 x 10mg) to control his blood pressure. Optimizing the potential for independence requires family support.³⁴ Accordingly, in this case, family education and coordination are required to monitor and support the home exercise program and movement restrictions.

Good family support can boost geriatrics' levels of happiness. Additionally, as people age, their social circle tends to become smaller, and family support is seen as a crucial element in the social lives of the elderly. Family social capital, which includes family bonds, family interactions, and family support, impacts the welfare of the elderly significantly.³⁵ According to a study, older people who receive emotional and decisional support from their families report higher life satisfaction.³⁶



Figure 7. Patient's progress from the first visit until 10 weeks rehabilitation program

Quality of life, according to the World Health Organization (WHO), is “an individual's perception of their position in life in the context of the culture in which they live and in relation to their goals, expectations, standards, and concerns.” Quality of life is essential to making medical decisions as it is a predictor of treatment success and therefore prognostically important to improve the relief of symptoms, treatment, and rehabilitation of patients. This is also used to help identify problems that may affect the patient. This kind of information can be shared with future patients to help them better anticipate and understand the effects of their illness and treatment.³⁷

Evaluation of the quality of life of the elderly in this case uses the EQ5D instrument. The EQ5D is an instrument that evaluates general quality of life by asking

patients questions that describe mobility, self-care, usual activities, pain or discomfort, and anxiety/depression.³⁸ There is an improvement in quality of life after the combination therapy given to patients. This may be because the moderate pain that the patient initially feels makes it difficult for the patient to walk and carry out daily activities, so he is very dependent on others. Along with pain improvement, the patient's independence increases, and the effect on the quality of life increases. The existence of good family support can also support the improvement of the patient's quality of life.

The use of a thoracolumbosacral brace should be considered. Although less than ideal, it can help reduce pain, maintain posture, slow progression, and prevent deterioration.^{39,40,41} However, the brace is not recommended at this time due to the worsening of the chest wall expansion. Chronic bracing can also lead to muscle deconditioning, which worsens curve advancement rather than stabilizing the deformity.²⁶ The patient will be regularly evaluated to monitor the results of the treatment. If there is any clinical or radiological worsening in the next 4 months,

the patient will be re-suggested for invasive treatment.

CONCLUSION

Improving the quality of life of geriatric patients requires a multi-dimensional approach. The improvement of pain, cardiorespiratory endurance, independence, and quality of life was achieved through a combination of two-times-a-week hospital-based and daily home-based exercise. Each exercise must be safe considering the patient's age, health condition, and vertebral fractures. Family support is important to monitor and encourage the patient during the home program, which includes chest expansion exercises, low-intensity aerobic exercises, and strengthening exercises.

DISCLOSURES

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Conflict of Interest

The author declares there is no conflict of interest regarding the publication of the current report.

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Author Contribution

All the authors equally contributed to the report, from the data gathering, physical examination, supporting investigation, and reporting the results of the case.

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