

Severe Kyphosis Patients with Tuberculosis and Chronic Obstructive Pulmonary Disease: A case report

ABSTRACT

Background: Severe kyphosis in advanced age, with a higher incidence observed in women and in elderly males afflicted with pulmonary tuberculosis (TB) and chronic obstructive pulmonary disease (COPD) can pose a significant risk to their overall well-being and potentially endanger their lives.

Methods: A 59-year-old male with respiratory problem, chronic back pain, and walking disorder was admitted to the emergency room with symptoms of shortness of breath that had been worse in the previous three days. According to the patient's mother, the patient's chest had been bent or arched, curved anterior sternum, since he was three years old but had never been referred to a hospital or undergone any medical treatment. Anti-tuberculosis and COPD treatment with physiotherapy during the first 3 months was quite encouraging because now the patient can do light activities and work again.

Results: Delays in spinal correction are caused by a lack of early detection capabilities from an early age and late referral to the hospital. Because of his advanced age, the patient was not able to have thoracic surgery; instead, he received thoracic manual treatment in addition to physiotherapy at a distant facility with restricted surgical capabilities. Rather, physiotherapy, which included thoracic corrective exercises and scapular posture. Correcting thoracic posture, enhancing structural alignment, and increasing thoracic rigidity are the main objectives of this activity.

Conclusion: Patients with severe cases of kyphosis require early detection of bone abnormalities by primary health center staff. Corrections can be made to prevent reduced body function, musculoskeletal disorders, and quality of life.

Keywords

Severe kyphosis, Tuberculosis, COPD, Physiotherapy

INTRODUCTION

Severe kyphosis is defined as a curvature of the kyphosis angle that exceeds the usual range. Increased kyphosis angle is caused by decreased muscle strength and degenerative changes in the spine. Almost 40% of people with severe kyphosis may suffer from spine fractures.¹⁻³ In elder people, the prevalence of severe kyphosis ranges from 20% to 40%, with higher incidence observed in women.^{4,5} Severe kyphosis was associated with negative health outcomes such as decreased lung function and physical ability, chronic back pain, a twofold increase in the risk of falling, and a worse quality of life.⁶

According to the Global Tuberculosis Report 2020, Indonesia was responsible for 14% of all tuberculosis cases worldwide.⁷ Back and chest pain are common symptoms of spinal tuberculosis.^{8,9} Surgical interventions for spinal fractures such as vertebroplasty and kyphoplasty are undertaken because they are minimally invasive and have a sagittal corrective impact of about 70%.^{10,11} Physiotherapy, which includes manual therapy, taping, and bracing, should always be the first line of treatment for thoracic Severe kyphosis, and it should be started as soon as feasible.¹² Thoracic Severe kyphosis therapy attempts to restore physical function, reduce pain, and reduce excessive anteroposterior curvature.¹³ The resultant damage from COPD, combined with the aging process, will have a deleterious impact on the entire body in elderly adults with thoracic kyphosis.^{14,15} We present severe kyphosis patients with tuberculosis and COPD in this study.

CASE SUMMARY

A 59-year-old male was admitted to the emergency room with symptoms of shortness of breath that had been worse in the previous three days and complaints of shortness of breath for the previous year, which became worse when the patient undertook activities. The patient has been cough, fatigue, and chronic back discomfort. The patient denied loss of appetite,

weight loss, or fever. He has been using a cane for many years and frequently falls if he does not use a cane. He had been smoking since he was 18 years old and worked as a parking attendant for more than 30 years at public fuel stations. According to the patient's mother, the patient's chest had been bent or arched since he was three years old but had never been referred to a hospital or undergone any medical treatment. Physical examination of the lungs revealed crackles, wheezing, and prolonged expiration, a heart rate of 110 beats per minute (bpm), respiratory rate of 28 bpm, oxygen saturation of 85% and it appear pectus carinatum. He was sent to intensive care unit and treated with nonrebreathing mask oxygen therapy, NaCl 0.9% infusion, aminophylline, ipratropium bromide-albuterol sulfate inhalation, budesonide inhalation, methylprednisolone injection, levofloxacin, omeprazole, furosemide, digoxin, rifampicin, isoniazid, pyrazinamide, and ethambutol based on body weight. The blood work showed leukocytes 28,230 cells/ul, and the sputum examination/molecular quick test results were positive for tuberculosis. **Figure 1** shows a tenting right hemidiaphragm, curved anterior sternum and kyphotic thoracic vertebrae on a lateral chest x-ray. The patient's health improved after the fifth day of therapy and was discharged from the hospital after ten days of treatment. Due to the restricted resources in the hospital, the patient performed a Cobb angle measurement with a simple goniometer/ruler to measure the kyphosis curvature before leaving the hospital, and the results of the examination revealed that the thoracic flexion curve was more than 107 degrees. When this patient bends over, a hump is noticeable (**figures 2a and 2b**). Outpatient treatment for tuberculosis and COPD is maintained. Due to the patient's age, limited hospital operating facilities for surgery, and refusal to be referred to a hospital with full facilities because it was too far away from his home, the patient finally underwent thoracic manual physiotherapy and was evaluated after 3 months. The outcomes of the combination of antituberculosis and COPD medications, together with physiotherapy, are extremely positive, as the patient can now perform mild tasks and has resumed work.

DISCUSSION

This is our first case, an elderly patient with severe kyphosis, pectus carinatum, TB, clinical COPD, and short stature. The patient's severe kyphosis had gone undetected and untreated since childhood. He was never advised to be referred to the hospital for medical treatment. According to Kado et al., severe kyphosis is more prevalent in women, and the majority of kyphosis angles increase with age.¹⁶ Pectus carinatum (PC) is a congenital abnormality of the chest wall, prominent during puberty with the peak age being 16 to 18 years. It can present with other anomalies, such as kyphosis. PC and kyphosis can cause dyspnea, back pain, decreased endurance and can be corrected surgically or through bracing. Other surgical options are performed for cosmetic purposes, treating cardiopulmonary complications, and preventing progressive postural deformity.¹⁷

We considered the possibility of genetic disorders such as Morquio A syndrome, also called mucopolysaccharidosis IVA, is an extremely rare autosomal recessive disorder characterized as an “inborn error of metabolism”, unpredictable in its age-sensitive nature, rate of progression, type and severity of symptoms. Initial symptoms were recognized at a mean age of 2.1 years. Common presenting features include short stature, kyphosis, genu valgum, and pectus carinatum. Over time, progression of the disease affects quality of life and survival prognosis.¹⁸ Scheuermann's sickness is a juvenile form of severe kyphosis, defined by a defect in the cortical development plates of the vertebral bodies, which weakens the vertebral bodies and causes pinching, culminating at the end of growth and cartilage formation is no longer active.¹⁹ We cannot carry out genetic examination, because limited hospital facilities, not covered by national insurance and the patient's financial problems.

This patient had suffered from chronic back pain for years and walked slowly, using a cane to avoid falling. He had smoked since 18 years old and worked as a parking attendant at a public fuel station for more than 30 years. Thoracic severe kyphosis may result in musculoskeletal, neuromuscular, and sensory disorders, aging process progression, pain, dysfunction, breathing issues, restricted spine range of motion, osteoporotic fractures, reduced mobility, slower walking, poor balance, and exhaustion.²⁰⁻²³

In this patient, a lateral chest x-ray revealed a tenting right hemidiaphragm and kyphotic thoracic vertebrae. Chen et al. Study was unable to measure the Cobb angle before surgery using an X-ray coronal sequence due to a calcified abscess, but they were able to measure the kyphosis angle with an X-ray sagittal sequence.²⁴ Cobb angle measurements were performed on this patient using a simple goniometer, which was regarded to be the most accurate approach to determining kyphosis curvature.²⁵ The superior vertebra of the fourth thoracic vertebrae (T4) is typically less visible due to the excessive protrusion of other components. As a result, the usual angle ranges from T4 to T12.²⁶

Spinal tuberculosis often involves and destroys several adjacent vertebral bodies resulting in worsening kyphosis, can result in psychological, cardio-respiratory and neurological problems, especially if the kyphotic deformity is $> 90^\circ$. Surgery is always necessary to relieve spinal cord compression and to treat neurological complications, back pain and dysfunction, and poor sagittal balance. However, they resulted in minimal correction of kyphosis with a high rate of complications.²⁷

Pain is common in people with chronic obstructive pulmonary disease (COPD) and the cause of back pain in COPD may be due to postural dysfunction, including increased thoracic kyphosis. Postural deviations are more present in COPD compared with those without lung

disease but are not related to pain. Further research is needed to identify factors that contribute to these postural deviations.²⁸

In this situation, the patient was unable to undergo thoracic surgery due to his age, and the limited surgical facilities of the hospital. Instead, the patient was treated with antituberculosis and COPD medications, and physiotherapy, including thoracic correction exercises and scapular posture. The fundamental goals of this activity, which includes thoracic manual therapy and thoracic correction exercises, are to correct thoracic posture, improve structural alignment and rigidity of the thorax. Scapular posture helps patients with thoracic severe kyphosis. When the kyphosis angle surpasses 80°, surgery may improve lung function and sagittal plane balance.²⁹ Frankel scores worsened in 3 patients and did not improve in 5 patients in Wong et al.'s trial with early surgical intervention in 16 patients.³⁰ According to Chen et al., severe kyphosis and spinal cord tuberculosis require surgery to relieve compression, and after several weeks of halo traction, excellent orthopedic surgical treatment results.³¹ Prospective studies of kyphosis, show decreased lung function in both women and men. Amanda et al. reported severe kyphosis increases the risk of lung function decline, requiring intervention to prevent or slow the progression of kyphosis, thereby alleviating subsequent lung decline which is an important determinant of morbidity and mortality in the elderly.³²

Physiotherapy is usually the first line of treatment for thoracic severe kyphosis, and it should be started as soon as possible.¹² The primary goals of therapy for patients with thoracic severe kyphosis are to alleviate pain and improve physical function by eliminating excessive antero-posterior curvature. The early detection and treatment of severe kyphosis may reduce the incidence of fractures, falls, and functional deficits. Breathing exercises improve lung capacity and physical exertion tolerance. Gait training and balance workouts improve general

fitness and reduce the likelihood of falling.¹³ According to an international survey, patients with thoracic severe kyphosis react favorably to conservative treatment.³³

UNDER PEER REVIEW

CONCLUSION

We feel this case may shed new light on the treatment of severe kyphosis with tuberculosis and COPD. We administered TB and COPD medication as well as physiotherapy thoracic manual treatment may improve structural alignment and stiffness of the thorax, because the patient declined to be referred due to his age, delayed treatment and restricted hospital facilities. Three months later, the patient's condition had improved clinically. Lessons learned in this case are the importance of health workers in primary health center screening and detecting bone abnormalities at an early age and immediately referring patients to the hospital with full facilities so that corrections can be made early to prevent decreased body function, musculoskeletal disorders, and quality of life.

DATA AVAILABILITY

All relevant data have been included in the manuscript. Further details and information about the case are available upon request.

Ethical Approval

As per international standards or university standards written ethical approval has been collected and preserved by the author(s).

Consent

As per international standards or university standards, patient(s) written consent has been collected and preserved by the author(s).

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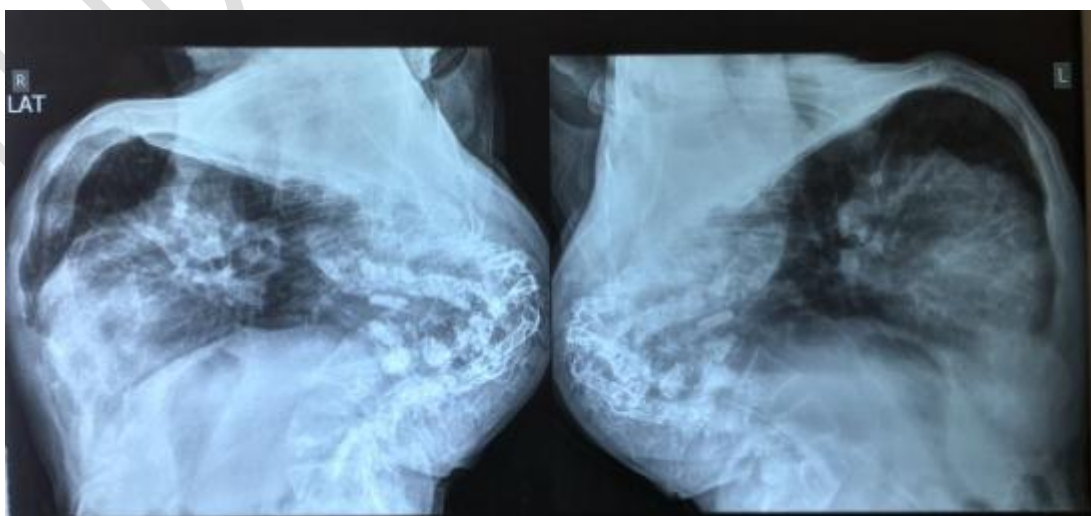


Figure 1. Lateral Chest X-ray



Figure 2a. Hyperkyphosis from lateral view



Figure 2b. A bump in hyperkyphosis patients, is visible when bending over