Post-laminectomy rotokyphoscoliosis causing paraplegia in long term: Case report

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Context: Childhood laminectomy can lead to spinal deformity. This is a report of a case of paraplegia caused by rotokyphoscoliosis, a late complication of laminectomy.

Findings: A 55-year-old woman developed paraplegia due to post-laminectomy kyphoscoliosis. She had surgery for a spinal tumor at age 13 years. She developed kyphosis 2 years after the laminectomy, which has been gradually progressing over the years. She experienced weakness of lower limbs that progressed to paraplegia. There was no evidence for tumor recurrence. To our knowledge, this is the first reported case of post-laminectomy kyphoscoliosis causing late-onset paraplegia.

Conclusions/clinical relevance: This case highlights a possible long-term complication of laminectomy without stabilization or untreated kyphoscoliosis. Children should be followed closely after laminectomy because development of spinal deformity is very common. Without intervention, the kyphosis might progress and in the long term, serious neurological complications may result, including paraplegia.

Keywords: Laminectomy, Spinal tumor, Astrocytoma, Intramedullary, Spinal deformity, Kyphosis, Scoliosis, Myelopathy, Paraplegia

Introduction

Childhood laminectomy is one of the causes of spinal deformity.¹ Kyphosis causing cord compression is very rare in the literature.²⁻⁶ We could find only one previous case of myelopathy caused by a severe kyphosis, which was due to previous trauma in a patient with Behcet's disease.² To our knowledge, this is the first case of paraplegia due to kyphoscoliosis that developed after laminectomy.

Case report

A 55-year-old woman with paraplegia was admitted to our clinic. Her medical history revealed spinal surgery for spinal tumor at age 13 years. Total laminectomy through C6-T4 and intramedullary tumor excision had been performed without fusion. Diagnosis was intramedullary astrocytoma. This tumor type represents 29% of pediatric spinal cord tumors.⁷

She reported no weakness, sensory deficit, or fecal or urinary incontinence after the surgery. Kyphosis had begun to develop 2 years after the surgery. Kyphosis continued to progress and 25 years after surgery, she began to feel weakness in her lower limbs that did not

impede ambulation. Weakness continued to increase and 38 years after surgery she was able to walk only with bilateral canes. However, she did not consent to surgery because of the risks explained to her. She reported that for the previous 4 months she had been unable to walk even with bilateral canes and had to use a wheelchair. She had no history of trauma, fracture, tuberculosis, or any other infections.

Physical examination revealed severe kyphoscoliosis and paraplegia at the level of T3 AIS-C. Voluntary anal contraction and sensation were preserved. Sensory level was T3; all levels below were hyposensitive. Pin prick and light touch scores were 38 bilaterally. Total motor scores were 28 on the right and 39 on the left. Upper limb examination was normal. Deep tendon reflexes were hyperactive. Babinski sign and Achilles clonus were positive bilaterally. Grade 3 spasticity of the lower limbs was recorded according to the modified Ashworth scale.

Plain graphs showed marked kyphosis and scoliosis (Figs. 1A and 1B). Magnetic resonance imaging (MRI) revealed that the calibration of spinal cord significantly decreased beginning from C7 vertebral level. No recurrence of tumor was seen (Fig. 1C). Computed tomography (CT) revealed severe kyphoscoliosis, rotation of vertebral bodies, cervico-toracholumbar S-shaped scoliosis, and severe kyphosis with the apex at

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Figure 1 (A) Plain graphs showing marked kyphosis and (B) scoliosis. (C) MRI of kyphoscoliosis showing severe angulation.

T4 vertebra. There were defects caused by laminectomies between C6 and T4 vertebrae (Fig. 2).

Hematological screening including erythrocyte sedimentation rate and C-reactive protein were normal. Respiratory function tests showed that the forced vital capacity was 30.1%. On measurement of bone mineral density (BMD), T scores were -2.7 at L1–L4 and -3.6 at the femoral neck.

During the rehabilitation program, kyphoscoliosis hindered her ability to do exercises. She did not benefit from exercises. She refused surgical intervention.

Discussion

Laminectomy performed on the immature vertebral column is a known cause of spinal deformity.

Removal of the laminae increases the forces on the vertebral bodies, resulting in instability; kyphoscoliosis can occur as a long-term sequela.¹

Deformities following laminectomy can be prevented by performing posterolateral fusion or osteoplastic laminotomy.^{1,8} This patient had had multilevel laminectomy without stabilization at age 13 years. Post-laminectomy deformities in childhood may progress and deteriorate during periods of rapid growth, as in puberty. Unless treated, spinal deformities may progress especially if they developed prior to maturation of the vertebral column.¹ Average time for the development of spinal deformity was reported to be 33 months.¹ In this case, spinal deformity started to develop 2 years after the surgery, which corresponded with puberty.

Figure 2 Reconstruction CT image of vertebral column. Severe kyphoscoliosis and rotation of vertebral bodies.

Kyphoscoliosis became evident and continued to advance over time. In our opinion, the primary cause of her kyphoscoliosis is the previous surgery and the lack of intervention that enabled progression.

Lumbar and hip BMD T-scores in this patient were in the osteoporotic range. CT showed increased trabeculation through the vertebral column, multiple vertebral compressions, loss of height, and deformities on upper thoracic and cervical vertebrae. We suggest that osteoporosis might have contributed to post-menopausal worsening of kyphoscoliosis.

Cord compression due to kyphosis is very rare in the literature. Kyphosis secondary to Scheuermann's disease, dystrophic deformity, or previous trauma has been reported to cause cord compression with various manifestations such as Babinski sign, clonus, somatosensoriel evoked potential abnormalities without neurological deficit.³⁻⁶ We found only one previous case of myelopathy caused by a severe kyphosis due to previous trauma.² This patient first developed kyphosis 2 years later and then weakness in her lower limbs 25 years after laminectomy. Approximately 42 years after the surgery, weakness progressed to paraplegia presenting with clinical manifestations appropriate with the level of the apex of kyphosis. To our knowledge, this is the first case of paraplegia due to post-laminectomy kyphosis.

Restrictive pulmonary problems are one of the main complications associating with severe kyphoscoliosis. Kyphoscoliosis can decrease the vital capacity, total lung capacity, and forced vital capacity (FVC). In this patient, FVC was found to be severely decreased. This

influences not only daily life but also tolerance for rehabilitation exercises.

Conclusion

This case highlights a possible long-term complication of laminectomy without stabilization or untreated kyphoscoliosis. Children should be followed closely after laminectomy because development of spinal deformity is highly possible. Timely and appropriate surgical treatment should be performed. Progressive kyphosis may cause serious complications including paraplegia. At this point, surgery and rehabilitation is harder to accomplish and prognosis is very poor.

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