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Case Report

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Neurological Deterioration Immediately After Lumbar Surgery: Anesthetic Consideration for Co-existing Cervical Lesion: A Case Report

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Conflict of Interest
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ABSTRACT

Most spine surgeons and anesthesiologists believe that the risk of spinal cord injury (SCI) during intubation is mainly due to mechanical compression of the spinal cord due to cervical spine movement in cases of undiagnosed but severe cervical lesions. With this reasoning, difficult intubation, which is more frequently encountered in patients with preexisting cervical diseases, is likely to result in SCI. Several reports have described SCI after non-cervical surgery in patients previously diagnosed with cervical myelopathy and a chronically compressed cervical cord; however, to date, there is less acknowledgement of SCI in patients with undiagnosed cervical myelopathy. Here, we report a painful experience of neurological deterioration that developed immediately after elective lumbar decompressive surgery in a 76-year-old man. The possible mechanism behind these unexpected complications is discussed in a review of the literature.

Keywords: Spinal cord injury; General anesthesia; Intubation

INTRODUCTION

The term "tandem spinal stenosis" is defined as the concurrent presence of stenosis at different locations of the spine. Although it is not rare and has often been encountered, decompression of specific lesions can only lead to a failure to improve due to persistent stenosis in another region.[4,5]

Moreover, when a patient has severe lumbar stenosis, such as cauda equina syndrome confined to the lower extremities, concurrent cervical stenosis may be obscured by symptoms due to a lumbar lesion.

Most spine surgeons and anesthesiologists believe that most iatrogenic neurological injuries during intubation occur due to a prolonged deformation in patients with underlying undiagnosed cervical myelopathy, impaired perfusion of the cord, and the emphasis mostly on cervical spine movements during intubation.[6,10]

Here, we report a bitter experience of spinal cord injury (SCI) that developed immediately after lumbar spinal decompressive surgery.

We also report the clinical effectiveness of rapid decompressive cervical surgery with a review of the literature.

CASE REPORT

A 76-year-old male patient (weight, 80 kg; height, 165 cm) had disabling back pain with motor weakness in both legs and voiding dysfunction for three months before admission. He reported a progressive worsening of gait imbalance, necessitating a cane for ambulation.

The patient's medical history was unremarkable except for hypertension, for which he was taking an oral antihypertensive agent. Neurological examination showed bilateral motor weakness of both lower extremities, especially upon knee extension, with a Medical Research Council (MRC) grade of 3/5. Preoperative hematological and serum chemistry tests, including platelet count, yielded normal results.

In addition, preoperative airway examination showed no specific neck motion limitation or cervical myelopathic symptoms. He displayed full strength of both upper extremities with intact input throughout.

Magnetic resonance (MR) images of the patient showed severe central canal stenosis with foraminal stenosis at the L4-5 level (**FIGURE 1**).

He underwent posterior lumbar interbody fusion with screw fixation at the L4-5 level. Anesthesia was induced with propofol, ketamine, and remifentanil. The trachea was intubated without overextending the neck as much as possible. The surgery lasted for three hours without any special events. When the position of the patient changed from prone to supine, the anesthesiologist dropped the patient's neck slightly. After the positional change, the propofol and remifentanil infusion was terminated. Eight minutes later, the patient responded to verbal commands and was able to voluntarily open his eyes and breathe

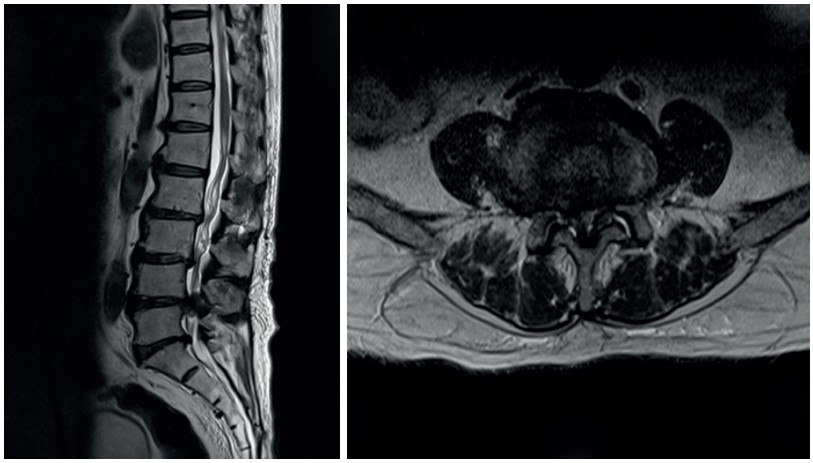

FIGURE 1. Preoperative sagittal and axial lumbar magnetic resonance images show severe central stenosis compressing cauda equina at L4-5 level.

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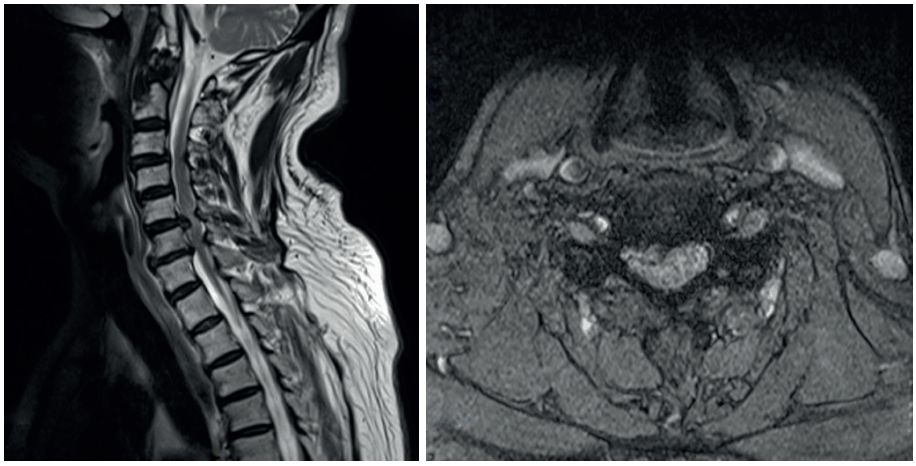

FIGURE 2. Emergent T2 weighted sagittal and axial cervical magnetic resonance images taken immediately after lumbar surgery reveal severe cervical cord stenosis with cord compression and high signal intensity suggesting cord injury at C5-6 and C6-7.

spontaneously; thus, the tracheal tube was removed without any issues, and vital signs remained stable after he was transferred to the recovery room.

However, 20 minutes after extubation, once he had fully emerged from anesthesia, he was found to have newly developed quadriparesis (MRC grade 3 in his upper extremities and grade 2 in his lower extremities). He also complained of severe paresthesia in both arms and a newly onset sensory deficit below the T2 dermatome. Additionally, he was hyperreflexic with a 2+ deep tendon reflex, though his rectal sensation was preserved. Emergent MR images of the cervical spine revealed severe cord compression and high signal intensity, suggestive of cord injury at the C5-6 and C6-7 levels (**FIGURE 2**).

The decision was made for an urgent two-level anterior approach at the C5-6 and C6-7 levels to decompress the spinal cord.

Three months after the surgery, the strength of his upper and lower extremities had markedly improved to nearly Grade IV^{+}, but voiding dysfunction remained after urine catheter insertion despite continuous rehabilitation treatment.

DISCUSSION

The term “tandem spinal stenosis” is used to describe coexisting spinal stenoses at different locations.

For patients with tandem cervical and lumbar stenoses that manifest as predominant lower extremities symptoms and signs without frank myelopathic signs, it can be a diagnostic challenge. The treatment will often be targeted toward the lumbar spine, which would usually undergo imaging studies more often and would tend to demonstrate degenerative stenosis, as is fairly common in elderly patients.

SCIs have been reported after various non-spinal surgeries and even following passive hyperextension of the cervical spine during dental extraction.[1,6,12]

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Moreover, there have been reports of SCIs developing even without intubation and SCIs in normal patients after prolonged intervals of spinal deformation while exercising.[2,11]

As such, it is important to understand the possible mechanism of neurological deterioration during intubation and anesthesia in the setting of undiagnosed cervical spondylosis in an aging population.

Postoperative quadriparesis is a very rare complication of surgery that does not involve the cervical spine. Mathkour et al.[7] reported a possible underlying mechanism, and most of their cases were associated with pre-existing cervical spondylosis in which the cervical cord was vulnerable to external compression. They found that the SCI was precipitated by inadequate neck extension during intubation, surgical positioning with overextension of the neck, and hypoperfusion related to relative hypotension.

That is, the current opinion is that most SCIs that occur during induction is the result of prolonged deformation, impaired perfusion of the cord, or both.[8,9]

The extension of the cervical spine increases the cervical cord diameter and predisposes the ligamentum flavum to compress the spinal cord and posterior longitudinal vessels. Flow through the radicular vessels is believed to be suppressed during cervical movement. Additionally, alteration of the spinal curvature can increase cerebrospinal fluid pressure and reduce cord perfusion pressure by 20 mmHg.[3]

Obviously, patients with pre-existing cervical spondylosis or subclinical myelopathy are at a greater risk of developing such SCIs.

In our case, the patient did not have to be overextended because tracheal intubation was not difficult, and his position was prone without neck extension during the operation. Anesthesia and surgery were stable except for a slight drop in the neck when the patient's position was changed from prone to supine.

Elderly patients naturally have an increasing incidence of underlying cervical spondylosis or subclinical myelopathy, which should be considered before surgery.

An estimated 85% of those over 60-year-old and almost everyone over the age of 80 years are known to have cervical spondylosis.[13]

In our case, the patient was 76 years old, and we should have been more careful and should have suspected severe cervical spondylosis or subclinical cervical myelopathy, even though there was no preoperative limitation of neck movement or clinical signs of myelopathy.

An effort to make accurate diagnosis, even in patients with subclinical myelopathy such as clinical suspicion and checking whole spine MR imaging is necessary to avoid unexpected SCI.

CONCLUSION

Based on our report, under general anesthesia, the co-existence of severe cervical spondylosis should be considered in elderly patients. A focused and careful preoperative neurological

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examination is important. Avoiding the overextension of the neck and being extremely cautious when changing the posture of patients are essential in reducing this unexpected complication.

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