Paraplegia by Acute Cervical Disc Protrusion after Lumbar Spine Surgery

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Non-traumatic paraplegia caused by herniation of the cervical intervertebral disc is an uncommon postoperative complication. A patient with claudication and radiculopathy was scheduled for lumbar laminectomy due to spinal stenosis. Postoperatively, numbness below T6 was found in his both legs of the patient. MRI showed a protruded intervertebral disc between C6 and C7. Despite urgent disectomy, the patient's lower extremities remained paralyzed without significant improvement for 3 months. Loss of muscle support during general anesthesia, excessive neck extension during endotracheal intubation and positioning, as well as bucking and agitation are believed as triggering factors for the protrusion of the cervical disc. We suggest that a complete history taking and physical examination be accomplished in patients scheduled for lumbar spine surgery in order to exclude coexisting cervical spine disorders. In addition, skillful endotracheal intubation and careful neck positioning are mandatory for patients receiving surgery in the prone position. *(Chang Gung Med J 2005;28:254-7)*

Key words: paraplegia, cervical disc herniation, lumbar laminectomy, postoperative complication.

Paraplegia after general anesthesia is a rare but devastating postoperative complication. Mechanical or ischemic injury is ascribed to be the most common etiology.[1-3] We present paraplegia due to acute herniation of the C6-C7 intervertebral disc in a patient with undiagnosed degenerative disc disease of the cervical spine.

CASE REPORT

A 54-year-old man with symptoms of low back pain underwent lumbar laminectomy under the diagnosis of spinal stenosis from L2-3 to L4-5. He had received laminectomy for lumbar herniated disc 11 years prior to this operation. No specific neck motion impairment was identified during the pre-anesthesia investigation. Medical history was unremarkable, and routine laboratory data were all within normal limits. Neurological examination revealed claudication and radiculopathy of the lower extremities. Monitors included 12-lead ECG, pulse oximetry, and non-invasive blood pressure. General anesthesia was induced by intravenous administration of fentanyl (150 μg), thiamylal sodium (250 mg) and atracurium (40 mg). Sevoflurane (2-4% end-tidal concentration) in 100% O_2 was used for the maintenance of anesthesia and the induction of controlled hypotension. Ventilation was kept normocapnia (30-35 mmHg end-tidal CO_2). The patient was placed in the prone position with his head turned to the left side with cushion support.

The operation, which lasted about 2 hours, was

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uneventful with a total blood loss of 250 mL. Throughout the procedure, the mean blood pressure (MAP) was maintained above 80 mmHg except during the 1-hour controlled hypotension where MAP was kept within 60 mmHg by the adjustment of sevoflurane concentration. The patient was changed to the supine position at the end of the surgery. While emerging from the anesthesia, the patient became irritable and began to buck against the endotracheal tube after the reversal of neuromuscular blocking agent. He was immediately extubated and sent to the postoperative care unit (PACU).

One hour after the arrival at the PACU, the patient was found to be flaccid in his both legs. Neurological examination revealed complete paralysis of the bilateral lower extremities with numbness below the T6 dermatome. An emergent MRI and myelogram showed a protruded intervertebral disc between C6 and C7 with spinal cord compression (Fig. 1). Several hours after the acute onset of paraplegia, the patient underwent urgent C6-C7 disectomy and anterior fusion with iliac bone graft. Despite the surgery, the patient's lower extremities remained paralyzed without significant improvement at 3 months of follow up.

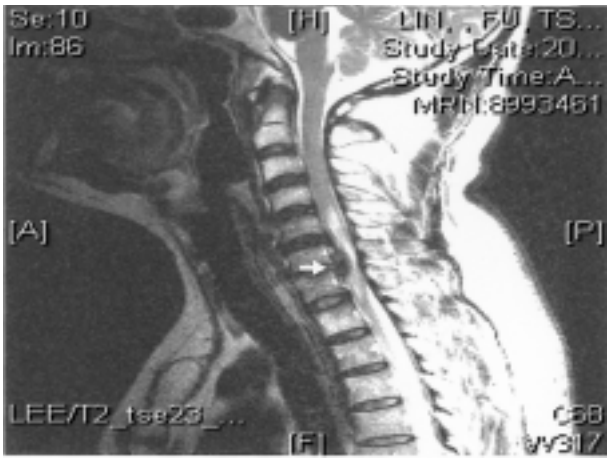

Fig. 1 Magnetic resonance imaging demonstrates disc protrusion at C6-C7 (arrow) with spinal cord compression.

DISCUSSION

Non-traumatic paraplegia caused by cervical disc herniation is rare, especially after general anesthesia[4,5] (Table 1). We present postoperative paraplegia due to acute compression of the spinal cord secondary to the protrusion of cervical intervertebral disc. The patient recalled experiencing episodes of numbness in his right hand before the operation. He did not pay much attention to it because he considered that was just a muscle strain as the result of heavy weight lifting at work. We speculate that our patient had problems preoperatively in the cervical intervertebral disc that caused paresthesia in his right hand. Thus, careful history taking and thorough neurological examination may disclose these symptoms and signs in patients with cervical spine diseases.

Due to the loss of muscle support by muscle relaxant given during general anesthesia,[1,6] excessive neck extension during endotracheal intubation and positioning, as well as bucking and agitation are believed to have been the triggering factors that exerted great stress on the preexisting undiagnosed bulging disc resulting in acute compression of the spinal cord.[7] Previously, researchers have demonstrated a high incidence of concomitant cervical and lumbar spine diseases in patients without history of trauma.[8,9] Patients presenting with lumbar spine problems should be evaluated thoroughly on their cervical spine during the pre-anesthetic visit. Preexisting neurological deficits should be documented appropriately. Positive findings in a detailed physical examination of the neck require additional neurological or radiological examinations. Several simple screening maneuvers can be done in patients with limited range of motion on the head and neck regions. Pain or paresthesia can also be sought during the movement.[1,6] In our patient, a history of numbness on his right hand should be regarded as an indication for further neurological or radiological examinations of the cervical spine.

Excessive neck movement can occur because of unanticipated difficult endotracheal intubation, head and neck positioning, bucking or agitation while emerging from anesthesia. Prone positioning is known to be a high risk factor for patients with preexisting cervical spinal cord dysfunction.[1,3] Because instability of the cervical spine is usually asymptomatic, care must be taken in order to maintain the neck in a neutral position during airway maneuvering and positioning. While prone positioning, a horseshoe cushion is recommended to support the patients' head and neck in a neutral position. In

Table 1. Reported Cases of Nontraumatic Acute Myelopathy Due to Cervical Disc Herniation

Authors	Year	Age (years)	Gender	Spinal Stenosis	Level	Recovery of Motor Function
Lourie et al	1973	37	M	-	C6-C7	+
Kawaguchi et al	1991	61	M	-	C6-C7	+
Warabi et al	1995	49	M	+	C6-C7	+
Ueyama et al	1999	61	F	+	C6-C7	+
Suzuki et al	2003	29	M	+	C6-C7	-
Chen et al	2004	54	M	-	C6-C7	-

Abbreviations: M: male; F: female.

patients with unstable cervical spines, awake intubation and positioning while the patients are awake is preferable.[3,10] While emerging from anesthesia, pharmacological interventions such as lidocaine or sedatives are well accepted as a means of suppressing the laryngeal reflex and involuntary movements that are deemed harmful to patients with unstable cervical spines. In patients with significant cervical spine diseases undergoing elective non-cervical spine surgery, cervical decompression should be considered as the initial treatment.

Determining diagnosis on acute spinal cord compression during general anesthesia appears to be difficult because patients who are still under sedation with the loss of sensation in the lower extremities are unable to voice any discomfort on the head and neck regions. Although postoperative paraplegia is rare, it is important to preoperatively identify patients with or without these symptoms and signs that would be at risk of developing serious neurological injuries after general anesthesia. Anesthesiologists and surgeons should be aware of this complication and a diagnosis should be promptly made for early interventions.

In conclusion, cervical spinal cord injuries after non-cervical spine surgery under general anesthesia are distressing complications, which often result in permanent disability or neurological deficit in patients with preexisting cervical spine diseases. We suggest that a complete history taking and physical examination be accomplished in patients scheduled for lumbar spine surgery in order to exclude the coexisting cervical spine disorders. In pre-operative evaluation, patients and their families should be informed of this risk with possible complications after general anesthesia. In addition, skillful intubation and careful positioning of the head and neck are mandatory for patients in the prone position.[1,11]

REFERENCES

1. Johann JL, Martin O, Alois O, Stephan F. Quadriplegia after lumbar disc surgery: a case report. Spine 1996;21: 1932-5.
2. Wilkes LL. Paraplegia from operation position and spinal stenosis in non-spinal surgery: a case report. J Neurol Surg 1980;146:148-9.
3. Deem S, Shapiro HM, Marshall LF. Quadriplegia in a patient with cervical spondylosis after thoracolumbar surgery in the prone position. Anesthesiology 1991;75: 527-8.
4. Ueyama T, Tamaki N, Kondoh T, Miyamoto H, Akiyama H, Nagashima T. Non-traumatic acute paraplegia associated with cervical disc herniation: a case report. Surg Neurol 1999;52:204-7.
5. Suzuki T, Abe E, Murai H, Kobayashi T. Nontraumatic acute complete paraplegia resulting from cervical disc herniation: a case report. Spine 2003;28:E125-8.
6. Warner MA. Positioning the head and neck. In: Martin JT, Warner MA, eds. Positioning in anesthesia and surgery. Philadelphia: WB Saunder, 1997:223-31.
7. Hastings RH, Kelly SD. Neurologic deterioration associated with airway management in a cervical spine-injured patient. Anesthesiology 1993;78:580-3.
8. Jacobs B, Ghelman B, Marchisello P. Coexistence of cervical and lumbar disc disease. Spine 1990;15:1261-4.
9. Teng P, Paoatheodorou G. Combined cervical and lumbar spondylosis. Arch Neurol 1964;10:298-307.
10. Gravenstein N, Grundy BL, Lobato EB. The central nervous system. In: Martin JT, Warner MA, eds. Positioning in anesthesia and surgery. Philadelphia: WB Saunder, 1997:289-94.
11. Martin JT. The ventral decubitus (prone) positions. In: Martin JT, Warner MA, eds. Positioning in anesthesia and surgery. Philadelphia: WB Saunder, 1997:155-92.

腰椎手術後因頸椎椎間盤突出導致急性下半身癱瘓

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由於頸椎椎間盤突出導致非創傷性下半身癱瘓是罕見的術後併發症。一病例由於腰椎狹窄而接受椎板切除術。在術後一小時於麻醉恢復室發現下半身癱瘓合併胸部第 6 皮節以下感覺麻木，經核磁共振檢查發現第 6 至第 7 節頸椎椎間盤突出壓迫脊髓。雖經緊急手術作椎間盤切除，很遺憾病患的下半身癱瘓在 3 個月之後仍然沒有改善。在全身麻醉下肌肉鬆弛後喪失關節的支持保護能力，以及在插管及手術姿勢擺設的過程中會造成不穩定頸椎的移動，還有咳嗽及躁動引起頸部的劇烈運動，都是有可能誘發頸椎椎間盤突出的原因。從這個病例我們學習到退化性腰椎疾病患者，在手術全身麻醉前必須仔細評估是否有合併頸椎的問題，另一方面，要注意氣管內插管技巧以避免頸椎受傷，對於以俯臥姿手術的病患要特別小心頸部轉動可能造成的問題。(長庚醫誌 2005;28:254-7)

關鍵字：下半身癱瘓，頸椎，椎間盤突出，腰椎，椎板切除術，術後併發症。

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