

Cervical spinal cord compression after thyroidectomy under general anesthesia

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Abstract Cervical spinal cord injury is a rare but serious complication after general anesthesia. The risk factors include traumatic cervical injury, cervical spine instability, and difficult airway management. It has also occurred in the absence of cervical instability. Here we report a patient who had a history of intermittent neck pain without numbness. Preoperative radiologic examinations showed degenerative changes in the cervical spine. She developed progressive tingling and numbness in her limbs after thyroidectomy under general anesthesia. Magnetic resonance imaging showed a cervical disc protruding into the canal at C5–C6, which was considered to be induced by surgical positioning. She recovered after anterior cervical decompression and internal fixation surgery.

Keywords Spinal cord injury · Thyroidectomy · General anesthesia · Patient positioning

Introduction

Cervical spinal cord injury is a rare but serious complication after general anesthesia. The risk factors include traumatic cervical injury, cervical spine instability, and difficult airway management [1–3]. Studies by Hindman

et al. [4] showed that cervical spinal cord injury was associated with cervical spine surgery, sitting procedures, and cervical spondylosis by a closed claims analysis. However, some cervical injuries seem to be inevitable. Here we reported a patient who had cervical degenerative disease and presented with acute cervical spinal cord compression after thyroidectomy. Written informed consent was obtained before preparation and submission of this manuscript.

Case report

A 58-year-old woman (height 158 cm, weight 53 kg) was scheduled for subtotal thyroidectomy as routine physical examination had revealed multiple thyroid nodules. Previously she had symptoms of intermittent neck pain without numbness in the limbs. Preoperative X-ray showed cervical bone hyperplasia and disc disorders at the C6–C7 level. A computed tomography scan did not show compression of the spinal canal and cervical spinal cord.

Fifteen minutes before induction, the patient was placed in a surgical position. The patient's neck was extended, and a cylindrical towel was placed under her back to facilitate good surgical exposure. She did not feel any abnormalities. Routine intraoperative monitoring including pulse oximetry, electrocardiogram, noninvasive blood pressure, and end-tidal capnography was used. Anesthesia was induced with propofol and fentanyl. After intravenous administration of vecuronium, the trachea was easily intubated with a 6.5-mm-ID endotracheal tube by McGrath videolaryngoscope (Cormack and Lehane grade I). The lungs were ventilated to maintain the end-tidal CO₂ concentration at 35–45 mmHg. Anesthesia was maintained with sevoflurane and remifentanyl. The patient was kept with neck extension

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throughout the surgery. There were no episodes of hypotension or any other complications during operation. Duration of the surgery was 120 min.

She was extubated immediately after surgery and transported to the post-anesthesia care unit (PACU). The patient was monitored for 1 h in the PACU. There were no complications. Although she felt tingling and numbness in her lower limbs, she did not complain to the doctor. She was conscious and her vital signs were stable. Thus, she was discharged to the ward.

After her return to the ward, the symptoms of tingling and numbness in her lower limbs became progressively worse, spreading from the lower limbs to the abdominal and thoracic areas and upper limbs. Soon the patient became agitated and was unable to control the movement of her limbs. An emergent blood test did not show any abnormalities in electrolytes. Two hours later she became quiet and could not move her lower limbs voluntarily. Cervical spinal cord injury was suspected after a manual muscle test by a consultant neurologist. Clinical examination showed that the patient was conscious without pain.



Fig. 1 Magnetic resonance imaging (MRI) showed cervical disc herniation at the C5–C6 level (T₁-weighted view). The posterior dural sac was compressed. A linear band of long T₁ and long T₂ signals at the level of C4–C7 in the spinal cord suggested cervical cord edema caused by compression. Schmorl's node was found in the C7 vertebra (arrow)

Motor function and deep tendon reflexes were weak in the lower limbs. The strength of the elbow extensors was decreased, although the strength of the elbow flexors was normal. Movement of her fingers was dull. Muscle tension in arms and legs was normal. The patient was assessed as grade B according to the American Spinal Injury Association (ASIA) classification (more than half of key muscles below the neurological level have a muscle grade of less than 3/5).

Magnetic resonance imaging (MRI), performed 8 h after the onset of symptoms (Fig. 1), showed cervical disc herniation at the C5–C6 level. The posterior dural sac was compressed. A linear band of long T₁ and long T₂ signals in the level of C4–C7 in the spinal cord suggested cervical cord edema caused by compression. Schmorl's node was found in the C7 vertebra. Her symptoms were not improved by conservative therapy with methylprednisolone. Anterior cervical decompression and internal fixation surgery were performed 16 h after the onset of symptoms. Immediately after cervical surgery, the motor functions in her lower limbs recovered. Full recovery of finger movement was achieved on postoperative day 7. A postoperative radiograph confirmed the internal fixation, and MRI showed the cervical spinal cord compression had been relieved.

Discussion

Compared with other complications after general anesthesia, cervical spinal cord injury is less often reported but more disabling. Airway management is considered to be one risk factor for deteriorating neurological function in patients with cervical spine lesions [5]. In the absence of cervical instability, severe cervical spondylosis is a high risk factor for cervical cord injury [4]. The risk may be increased by cervical extension, the sitting position, or systemic hypotension.

The neck extension position is often used to achieve good exposure for thyroidectomy. Watanabe et al. [6] reported a case with symptoms of slight numbness from cervical spondylosis myelopathy before the operation. This patient presented with central cord syndrome following thyroidectomy, and postoperative MRI showed spinal cord stenosis. The clinical manifestation and treatment were different from our case.

In the present case, some measures were taken to prevent nerve injury but it still occurred. The patient had a history of intermittent neck pain without numbness. Thus, preoperative radiologic examinations were performed. An X-ray indicated degenerative changes in the cervical spine, but a computed tomography (CT) scan did not show compression of the spinal canal and cervical spinal cord. To avoid iatrogenic nerve injury, the patient was positioned

when she was awake. A videolaryngoscope was used for the intubation. Compared with a conventional laryngoscope, the videolaryngoscope could provide a better glottic view with less neck movement [7]. It has also been considered in patients with immobilized cervical spine. Although the neck extension was not aggravated during intubation or during the surgery, postoperative MRI showed cervical disc protrusion to the spinal canal at C5–C6. Therefore, the explanation of acute cervical spinal cord compression was that the patient had a history of cervical degenerative disease, and surgical positioning induced intervertebral disc herniation and then caused cervical spinal cord ischemia.

The symptoms related to cervical spinal cord injury could arise immediately after surgery or within 24 h post procedure. It may be mild or severe depending on the degree of cervical spinal cord compression. The common symptoms include pain, sensory changes, muscle weakness, muscle spasms, and bowel and bladder dysfunction. In the present case, the symptoms developed progressively, from tingling and numbness in the lower limbs to uncontrollable movement of limbs, muscle weakness in lower limbs, and hand incoordination. Immediate MRI scanning was used to make a definite diagnosis.

Management for acute cervical spinal cord injury without cervical spine fracture or dislocation includes pharmacological agents and surgical intervention. Clinical evidence has shown, however, that early decompression of the spinal cord could reduce secondary complications and improve the neurological outcome [8].

In certain conditions, the risk of cervical spinal cord injury is difficult to predict. Some patients could be asymptomatic with degenerative changes of the cervical spine and significant cervical stenosis [9], reminding anesthesiologists and surgeons that extended neck position for thyroidectomy could increase the risk of neurological

injury. Early recognition and management is benefit to the recovery of neurological function [10].

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